

# Term 1 Cycle 1 Year 7 Maths

## Skill Builder



Not about being better than others, just being the best **you** can be!

Name: \_\_\_\_\_

Form: \_\_\_\_\_



# MATHS MATE



## Worksheet Results

**Term 1**

Name: .....

Class: .....

Teacher: .....

		Sheet 1	Sheet 2	Sheet 3	Sheet 4	Skill Builder links	Sheet 5	Sheet 6	Sheet 7	Sheet 8	Skill Builder links
<b>NUMBER &amp; ALGEBRA</b>	1. [+ Whole Numbers to 10]	1	1	1	1	1.1	1	1	1	1	1.1
	2. [- Whole Numbers to 10]	2	2	2	2	2.1	2	2	2	2	2.1
	3. [× Whole Numbers to 12]	3	3	3	3	3.1	3	3	3	3	3.1
	4. [+ Whole Numbers to 12]	4	4	4	4	4.1	4	4	4	4	4.1
	5. [Large Number +,-]	5	5	5	5	5.4	5	5	5	5	5.3
	6. [Large Number ×,+]	6	6	6	6	6.2	6	6	6	6	6.1,5
	7. [Decimal +,-]	7	7	7	7	7.1	7	7	7	7	7.2
	8. [Decimal ×,+]	8	8	8	8	8.3	8	8	8	8	8.1
	9. [Fraction +,-]	9	9	9	9	9.1,2	9	9	9	9	9.3,4
	10. [Fraction ×,+]	10	10	10	10	10.1	10	10	10	10	10.2
	11. [Percentages]	11	11	11	11	11.2	11	11	11	11	11.3
	12. [Decimals / Fractions / Percentages]	12	12	12	12	12.4	12	12	12	12	12.2
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	14. [Rates / Ratios]	14	14	14	14	14.1,2	14	14	14	14	14.3
	15. [Indices / Square Roots]	15	15	15	15	15.2	15	15	15	15	15.3
	16. [Order of Operations]	16	16	16	16	16.2	16	16	16	16	16.4
	17. [Exploring Numbers]	17	17	17	17	17.2	17	17	17	17	17.2
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	33. [Problem Solving 3]	33	33	33	33	Hints & Solutions	33	33	33	33	Hints & Solutions
<b>Total Correct</b>		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

# 1. [+ Whole Numbers to 10]

## Skill 1.1 Adding whole numbers from 1 to 10.

MM7 11 22 33 44  
MM8 11 22 33 44

**EITHER**  
**Regroup into easier numbers**

- Break a number up so that you can work with groups of 10
- Example:  $5 + 8$   
 $= 5 + 5 + 3$   
 $= 10 + 3$   
 $= 13$

**OR**  
**Count on**

- Start with the largest number and count on the smaller amount.
- Example:  
 $8 + 5 \Rightarrow 9, 10, 11, 12, 13$

**OR**  
**Use an addition table**

- Move down the column and across the row to find the intersection.

+	1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11	12
3	4	5	6	7	8	9	10	11	12	13
4	5	6	7	8	9	10	11	12	13	14
5	6	7	8	9	10	11	12	13	14	15
6	7	8	9	10	11	12	13	14	15	16
7	8	9	10	11	12	13	14	15	16	17
8	9	10	11	12	13	14	15	16	17	18
9	10	11	12	13	14	15	16	17	18	19
10	11	12	13	14	15	16	17	18	19	20

Example:  
 $8 + 5 = 5 + 8 = 13$   
 Hint: Addition tables are symmetrical.

<b>Q.</b>		5	2	7	3	8	6	1	10	9	4	Add 8 to each of the numbers in the top row.
	+ 8											

<b>A.</b>		5	2	7	3	8	6	1	10	9	4
	+ 8	13	10	15	11	16	14	9	18	17	12

a)

		5	7	10	9	16	8	3	4	12	11
	+ 10	15	17	20							

b)

		3	12	6	8	10	7	4	9	5	11
	+ 3										

c)

		23	16	12	18	9	11	20	7	15	24
	+ 6										

d)

		32	8	35	7	19	13	11	44	16	10
	+ 5										

e)

		14	45	20	86	19	47	15	32	8	23
	+ 7										

## 2. [- Whole Numbers to 10]

### Skill 2.1 Subtracting whole numbers from 1 to 10.

MM7 11 22 33 44  
MM8 11 22 33 44

EITHER

#### Break down to easier numbers

- Break a number down so that you can work with groups of 10

$$\begin{aligned} \text{Example: } 16 - 9 & \\ &= 15 - 8 \\ &= 14 - 7 \\ &= 13 - 6 \\ &= 12 - 5 \\ &= 11 - 4 \\ &= 10 - 3 \\ &= 7 \end{aligned}$$

Make 16 into 10 by taking 6 from both 16 and 9.

OR

#### Build up to easier numbers

- Build a number up so that you can work with groups of 10.

$$\begin{aligned} \text{Example: } 16 - 9 & \\ \text{Add 1 to 9 to make 10} & \\ \text{and another 6 to get to 16.} & \\ 1 + 6 = 7 & \end{aligned}$$

OR

#### Use an addition table

- Move down the column and across the row to find the intersection.

+	1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11	12
3	4	5	6	7	8	9	10	11	12	13
4	5	6	7	8	9	10	11	12	13	14
5	6	7	8	9	10	11	12	13	14	15
6	7	8	9	10	11	12	13	14	15	16
7	8	9	10	11	12	13	14	15	16	17
8	9	10	11	12	13	14	15	16	17	18
9	10	11	12	13	14	15	16	17	18	19
10	11	12	13	14	15	16	17	18	19	20

Example:  $16 - 9 = ?$

Reword the subtraction by turning it into an addition.

What number when added to 9 will give 16?

From the addition table,

$$9 + 7 = 16$$

$$\text{So } 16 - 9 = 7$$

Q.

	16	14	17	10	18	13	11	19	15	12
- 9										

Subtract 9 from each of the numbers in the top row.

A.

	16	14	17	10	18	13	11	19	15	12
- 9	7	5	8	1	9	4	2	10	6	3

a)

	5	4	10	7	12	11	8	9	3	6
- 2	3									

b)

	14	17	10	15	12	18	13	16	11	9
- 8										

c)

	14	16	9	23	21	7	15	12	30	28
- 4										

d)

	20	14	23	16	32	25	17	18	11	49
- 7										

### 3. [ $\times$ Whole Numbers to 12]

#### Skill 3.1 Multiplying whole numbers from 1 to 12.

MM7 11 22 33 44  
MM8 11 22 33 44

- Find one of the numbers to be multiplied across the top row.
- Find the other number to be multiplied down the left hand side column.
- Follow the line of each number until they intersect at their product.

Example: The product of 3 and 9 is 27

$$3 \times 9 = 27$$

$$\text{Since } 3 \times 9 = 9 \times 3 = 27$$

multiplication tables are symmetrical.

Hint: This means you only need to learn half of your times tables.

MULTIPLICATION TABLE

$\times$	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Q.		3	12	9	7	4	5	10	8	6	11
	$\times 9$										

Multiply each of the numbers in the top row by 9.

A.		3	12	9	7	4	5	10	8	6	11
	$\times 9$	27	108	81	63	36	45	90	72	54	99

a)		4	8	11	10	5	6	1	7	9	2
	$\times 4$	16									

b)		1	5	10	7	4	9	12	8	3	6
	$\times 2$										

c)		8	10	2	7	9	3	11	5	6	4
	$\times 10$										

d)		2	4	8	5	7	6	12	9	11	3
	$\times 8$										

e)		10	4	3	6	2	5	7	8	12	9
	$\times 12$										

# 4. [÷ Whole Numbers to 12]

## Skill 4.1 Dividing whole numbers from 1 to 12.

MM7 11 22 33 44  
MM8 11 22 33 44

- Reword the division by turning it into a multiplication.
- Use a multiplication table.
- Convert the multiplication back to a division.

Example: How many 6's go into 42?

$$42 \div 6 = ?$$

Reworded: What number multiplied by 6 equals 42?

$$6 \times ? = 42$$

From the multiplication table,  $6 \times 7 = 42$

$$\text{So } 42 \div 6 = 7$$

MULTIPLICATION TABLE

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

<b>Q.</b>		42	60	18	36	30	54	72	24	12	48	Divide each of the numbers in the top row by 6.
	÷ 6											

<b>A.</b>		42	60	18	36	30	54	72	24	12	48
	÷ 6	7	10	3	6	5	9	12	4	2	8

a) 

	16	28	8	40	24	20	4	32	36	44
÷ 4	4									

b) 

	99	66	33	121	44	88	77	110	11	22
÷ 11										

c) 

	40	90	120	30	100	10	70	50	80	60
÷ 10										

d) 

	56	14	28	70	63	7	21	84	42	77
÷ 7										

e) 

	120	48	36	24	144	60	12	96	84	72
÷ 12										

**Skill 5.4 Subtracting large numbers with carry over (1).**

MM7 1 1 2 2 3 4  
MM8 1 1 2 2 3 3 4 4

- Always keep your working columns in line, aligning units with units, tens with tens, etc.
- Subtract from right to left.
- Whenever a number cannot be subtracted from another number to give a positive result then use:

EITHER

**Decomposition method** - Borrow from a higher place value and give to a lower place value.

Example:  $3541 - 194 = 3347$

**Units:**  $1 - 4 = ?$

Borrow 1 ten from the tens column (reduce the 4 tens to 3 tens) and give it as 10 units to the units column to make 11 units.

$11 - 4 = 7$  units

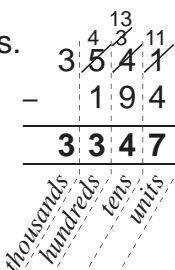
**Tens:**  $3 - 9 = ?$

Borrow 1 hundred from the hundreds column (reduce the 5 hundreds to 4 hundreds) and give it as 10 tens to the tens column to make 13 tens.

$13 - 9 = 4$  tens

**Hundreds:**  $4 - 1 = 3$  hundreds

**Thousands:**  $3 - 0 = 3$  thousands



OR

**Equal addition method** - Each time a number is added to the top it must also be added to the bottom but in different columns.

Example:  $3541 - 194 = 3347$

**Units:**  $1 - 4 = ?$

Add 10 units to the 1 and add 10 units (1 ten) to the 9 (bottom number in the tens column)

$11 - 4 = 7$  units

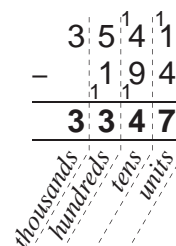
**Tens:**  $4 - (9 + 1) = ?$

Add 10 tens to the 4 and add 10 tens (1 hundred) to the 1 (bottom number in the hundreds column)

$14 - 10 = 4$  tens

**Hundreds:**  $5 - (1 + 1) = 3$  hundreds

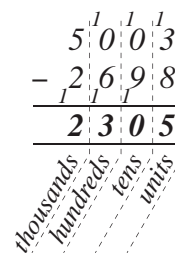
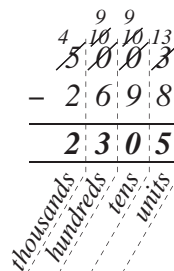
**Thousands:**  $3 - 0 = 3$  thousands



Q.  $5003 - 2698 =$

A.  $5003 - 2698 = 2305$

**Decomposition OR Equal addition**

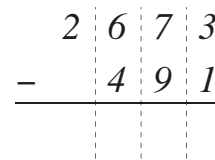
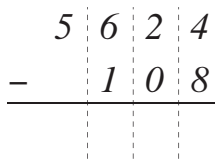
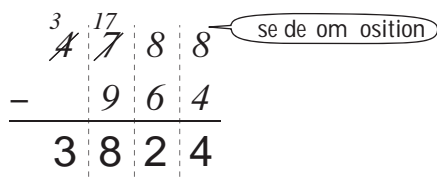


a)  $4788 - 964 =$

**3824**

b)  $5624 - 108 =$

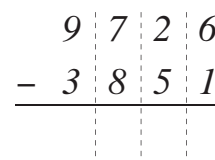
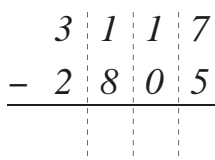
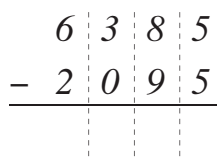
c)  $2673 - 491 =$



d)  $6385 - 2095 =$

e)  $3117 - 2805 =$

f)  $9726 - 3851 =$





**Skill 5.4 Subtracting large numbers with carry over (2).**

**g)**  $6319 - 254 =$        **h)**  $8536 - 914 =$        **i)**  $4467 - 318 =$

$$\begin{array}{r} 6319 \\ - 254 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 8536 \\ - 914 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 4467 \\ - 318 \\ \hline \\ \hline \end{array}$$

**j)**  $9307 - 2453 =$        **k)**  $4083 - 1957 =$        **l)**  $7062 - 2948 =$

$$\begin{array}{r} 9307 \\ - 2453 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 4083 \\ - 1957 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 7062 \\ - 2948 \\ \hline \\ \hline \end{array}$$

**m)**  $4208 - 657 =$        **n)**  $2009 - 121 =$        **o)**  $3564 - 285 =$

$$\begin{array}{r} 4208 \\ - 657 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 2009 \\ - 121 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 3564 \\ - 285 \\ \hline \\ \hline \end{array}$$

**p)**  $8357 - 489 =$        **q)**  $7231 - 645 =$        **r)**  $6534 - 3977 =$

$$\begin{array}{r} 8357 \\ - 489 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 7231 \\ - 645 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 6534 \\ - 3977 \\ \hline \\ \hline \end{array}$$

**s)**  $45328 - 8634 =$        **t)**  $31764 - 5936 =$        **u)**  $72004 - 4527 =$

$$\begin{array}{r} 45328 \\ - 8634 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 31764 \\ - 5936 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 72004 \\ - 4527 \\ \hline \\ \hline \end{array}$$

**v)**  $63148 - 7980 =$        **w)**  $52305 - 4615 =$        **x)**  $28007 - 3495 =$

$$\begin{array}{r} 63148 \\ - 7980 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 52305 \\ - 4615 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 28007 \\ - 3495 \\ \hline \\ \hline \end{array}$$

# 6. [Large Number $\times, \div$ ]

## Skill 6.1 Multiplying a large number by a power of 10.

MM7 1 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

When the multiplication is displayed in a **horizontal line**:

- Add the same number of zeros at the end of the given number as there are zeros in the power of 10.

When the multiplication is displayed in a **vertical algorithm**:

- Move each digit of the given number as many places to the left as there are zeros in the power of 10.
- Add zeros as place holders in the vacated places.

Q.  $376 \times 1000 =$

A.  $376 \times 1000 = 376000$  (Add 3 zeros)

a)  $318 \times 10 =$

b)  $2040 \times 10 =$

c)  $9080 \times 10 =$

d)  $238 \times 100 =$

e)  $7015 \times 100 =$

f)  $4619 \times 100 =$

g)  $179 \times 1000 =$

h)  $412 \times 1000 =$

i)  $905 \times 1000 =$

j)  $506 \times 1000 =$

k)  $803 \times 1000 =$

l)  $248 \times 1000 =$

**Skill 6.2** Dividing a large number by a power of 10.

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

- Remove as many zeros from the end of the given number as there are zeros in the power of 10.

Hint: If the division is written as a fraction simply cross off respective zeros from the top and bottom of the fraction.

**Q.**  $850\,000 \div 1000 =$

**A.**  $850\cancel{000} \div 1\cancel{000} =$   
 $= 850$

OR  $850\,000 \div 1000$   
 $= \frac{850\,000 \div 1000}{1000 \div 1000}$   
 $= \frac{850\cancel{000}}{1\cancel{000}}$   
 $= 850$

Any division can be written as a fraction.

Simplify by dividing both the numerator and denominator by 1000.

Cross off the respective zeros.

**a)**  $460 \div 10 =$

$= \frac{460 \div 10}{10 \div 10}$

$= \frac{46\cancel{0}}{1\cancel{0}} = \boxed{46}$

**b)**  $280 \div 10 =$

$= \frac{280 \div 10}{10 \div 10}$

$= \frac{28\cancel{0}}{1\cancel{0}} = \boxed{\phantom{00}}$

**c)**  $5020 \div 10 =$

$=$

$= \frac{502\cancel{0}}{1\cancel{0}} = \boxed{\phantom{00}}$

**d)**  $8900 \div 100 =$

$= \frac{8900 \div 100}{100 \div 100}$

$= \frac{89\cancel{00}}{1\cancel{00}} = \boxed{\phantom{00}}$

**e)**  $1500 \div 100 =$

$=$

$= \frac{15\cancel{00}}{1\cancel{00}} = \boxed{\phantom{00}}$

**f)**  $37\,000 \div 100 =$

$=$

$= \frac{370\cancel{00}}{1\cancel{00}} = \boxed{\phantom{00}}$

**g)**  $23\,000 \div 100 =$

$=$

$= \frac{230\cancel{00}}{1\cancel{00}} = \boxed{\phantom{00}}$

**h)**  $480\,000 \div 100 =$

$=$

$= \frac{4800\cancel{00}}{1\cancel{00}} = \boxed{\phantom{00}}$

**i)**  $200\,500 \div 100 =$

$=$

$= \frac{2005\cancel{00}}{1\cancel{00}} = \boxed{\phantom{00}}$

**j)**  $570\,000 \div 1000 =$

$=$

$= \frac{570\cancel{000}}{1\cancel{000}} = \boxed{\phantom{00}}$

**k)**  $706\,000 \div 1000 =$

$=$

$= \frac{706\cancel{000}}{1\cancel{000}} = \boxed{\phantom{00}}$

**l)**  $309\,000 \div 1000 =$

$=$

$= \frac{309\cancel{000}}{1\cancel{000}} = \boxed{\phantom{00}}$

# 7. [Decimal +,-]

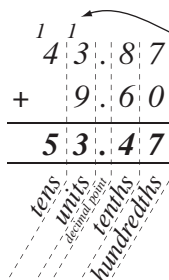
## Skill 7.1 Adding decimal numbers (1).

MM7 1 2 3 4 4  
MM8 1 2 3 4 4

- Always keep your working columns in line, aligning the decimal points, the decimal places, units with units, tens with tens, etc.
- Add from right to left.

Q.  $43.87 + 9.6 =$

A.  $43.87 + 9.6 = 53.47$  **Hundredths:**  $7 + 0 = 7 \Rightarrow 7$  hundredths

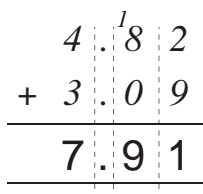


**Tenths:**  $8 + 6 = 14 \Rightarrow 4$  tenths  
Carry over 10 tenths as 1 unit

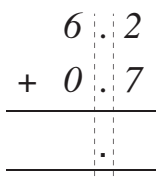
**Units:**  $3 + 9 + \text{carry } 1 = 13 \Rightarrow 3$  units  
Carry over 10 units as 1 ten

**Tens:**  $4 + 0 + \text{carry } 1 = 5 \Rightarrow 5$  tens

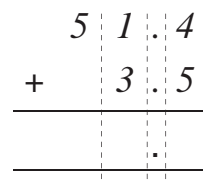
a)  $4.82 + 3.09 =$



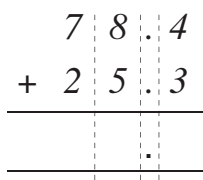
b)  $6.2 + 0.7 =$



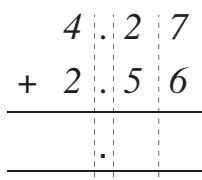
c)  $51.4 + 3.5 =$



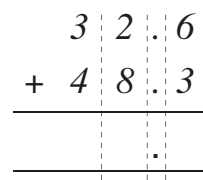
d)  $78.4 + 25.3 =$



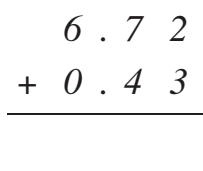
e)  $4.27 + 2.56 =$



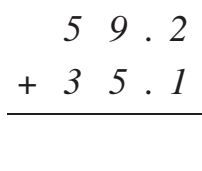
f)  $32.6 + 48.3 =$



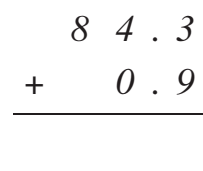
g)  $6.72 + 0.43 =$



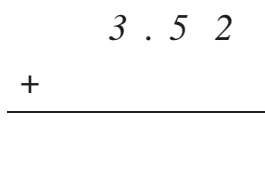
h)  $59.2 + 35.1 =$



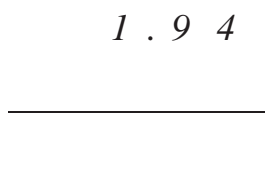
i)  $84.3 + 0.9 =$



j)  $3.52 + 40.08 =$



k)  $1.94 + 27.6 =$



l)  $51.4 + 3.58 =$



**Skill 7.1** Adding decimal numbers (2).

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

m)  $9.86 + 0.09 =$

$$\begin{array}{r} 9.86 \\ + 0.09 \\ \hline \end{array}$$

n)  $7.54 + 6.3 =$

$$\begin{array}{r} 7.54 \\ + 6.3 \\ \hline \end{array}$$

o)  $65.7 + 8 =$

$$\begin{array}{r} 65.7 \\ + 8.0 \\ \hline \end{array}$$

p)  $42.08 + 17.95 =$

$$\begin{array}{r} 42.08 \\ + 17.95 \\ \hline \end{array}$$

q)  $45.69 + 38.37 =$

$$\begin{array}{r} 45.69 \\ + 38.37 \\ \hline \end{array}$$

r)  $64.8 + 9.72 =$

$$\begin{array}{r} 64.8 \\ + 9.72 \\ \hline \end{array}$$

s)  $31.54 + 29.8 =$

$$\begin{array}{r} 31.54 \\ + 29.8 \\ \hline \end{array}$$

t)  $5.47 + 26.7 =$

$$\begin{array}{r} 5.47 \\ + 26.7 \\ \hline \end{array}$$

u)  $9 + 26.82 =$

$$\begin{array}{r} 9 \\ + 26.82 \\ \hline \end{array}$$

v)  $0.5 + 49.7 + 6.41 =$

$$\begin{array}{r} 0.5 \\ 49.7 \\ + 6.41 \\ \hline \end{array}$$

w)  $38.2 + 0.95 + 7 =$

$$\begin{array}{r} 38.2 \\ 0.95 \\ + 7 \\ \hline \end{array}$$

x)  $51.46 + 8 + 4.9 =$

$$\begin{array}{r} 51.46 \\ 8 \\ + 4.9 \\ \hline \end{array}$$

y)  $0.8 + 25.6 + 7.59 =$

$$\begin{array}{r} 0.8 \\ 25.6 \\ + 7.59 \\ \hline \end{array}$$

z)  $23.5 + 6.974 + 0.69 =$

$$\begin{array}{r} 23.5 \\ 6.974 \\ + 0.69 \\ \hline \end{array}$$

A)  $0.258 + 7.9 + 24.56 =$

$$\begin{array}{r} 0.258 \\ 7.9 \\ + 24.56 \\ \hline \end{array}$$

**Skill 8.3** Multiplying a decimal number by a power of 10.

MM7 1 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

**EITHER**

- Count the number of zeros in the power of 10.
- Move the decimal point to the right the same number of places.
- Remove all the zeros before and after the decimal number if needed.

Example:  $015.600 = 15.6$

- Add zeros as place holders if needed.  
Example:  $2.4 \times 100 = 2.4000 \times 100 = 240.00 = 240$

**OR**

- Write the number followed by the zeros, disregarding the decimal point.
- Count the number of decimal places in the question.
- Position the decimal point the same number of places from the right in the answer.

<b>Q.</b> $2.57 \times 1000 =$	<b>A.</b> $2.57 \times 1000 =$ $= 2.5700 \times 1000$ $= 2570$	<b>OR</b> $2.57$ ← 2 decimal places $\times 1000$ $\hline 2570.00$ ← 2 decimal places in the answer $2570.00 = 2570$
--------------------------------	--	---

<b>a)</b> $4.6 \times 10 =$ <span style="border: 1px solid black; padding: 2px 10px;">46</span>	<b>b)</b> $0.8 \times 10 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>c)</b> $5.3 \times 10 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>
$\begin{array}{r} 4.6 \\ \times 10 \\ \hline 46.0 \end{array}$	$\begin{array}{r} 0.8 \\ \times 10 \\ \hline 08.0 \end{array}$	$\begin{array}{r} 5.3 \\ \times 10 \\ \hline \end{array}$

<b>d)</b> $0.17 \times 10 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>e)</b> $3.29 \times 10 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>f)</b> $8.04 \times 10 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>
$\begin{array}{r} 0.17 \\ \times 10 \\ \hline 1.70 \end{array}$	$\begin{array}{r} 3.29 \\ \times 10 \\ \hline \end{array}$	$\begin{array}{r} 8.04 \\ \times 10 \\ \hline \end{array}$

<b>g)</b> $6.5 \times 100 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>h)</b> $0.177 \times 100 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>i)</b> $0.038 \times 100 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>
$\begin{array}{r} 6.5 \\ \times 100 \\ \hline 650.0 \end{array}$	$\begin{array}{r} 0.177 \\ \times 100 \\ \hline 17.700 \end{array}$	$\begin{array}{r} 0.038 \\ \times 100 \\ \hline \end{array}$

<b>j)</b> $13.2 \times 1000 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>k)</b> $7.54 \times 1000 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>l)</b> $9.06 \times 1000 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>
$\begin{array}{r} \times \\ \hline \end{array}$	$\begin{array}{r} \times \\ \hline \end{array}$	$\begin{array}{r} \times \\ \hline \end{array}$

<b>m)</b> $83.5 \times 1000 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>n)</b> $1.02 \times 1000 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>	<b>o)</b> $7.69 \times 1000 =$ <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; vertical-align: middle;"></span>
$\begin{array}{r} \times \\ \hline \end{array}$	$\begin{array}{r} \times \\ \hline \end{array}$	$\begin{array}{r} \times \\ \hline \end{array}$

# 9. [Fraction +,-]

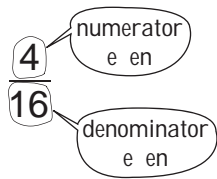
## Skill 9.1 Adding fractions with the same denominator (1).

MM7 11 22 33 44  
MM8 11 22 33 44

- Add the numerators (top numbers of the fractions).
- Do not change the denominators.
- Simplify the resulting fraction and/or change it to a mixed number if necessary.

### To simplify a fraction

Hint: If the numbers are both even then you can start dividing by 2.



- Divide both the numerator and the denominator by the same number.

$$\frac{4 \div 2}{16 \div 2} = \frac{2 \div 2}{8 \div 2} = \frac{1}{4}$$

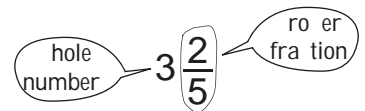
### To change an improper fraction to a mixed number



- Divide the numerator by the denominator.  
 $\frac{7}{3} = 7 \div 3 = 2 \text{ remainder } 1$
- Write the result as the whole number and the remainder over the denominator.  
 $\frac{7}{3} = 7 \div 3 = 2\frac{1}{3}$

### To change a mixed number to an improper fraction

#### MIXED NUMBER



- Multiply the whole number by the denominator and then add the result to the numerator.  
 $3\frac{2}{5} \rightarrow 3 \times 5 + 2 = 17$
- Rewrite the total over the denominator.

$$3\frac{2}{5} = \frac{17}{5}$$

Q.  $\frac{3}{5} + \frac{4}{5} =$

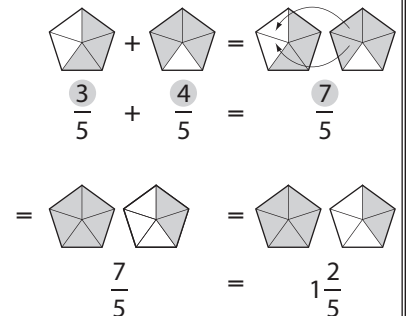
A.  $\frac{3}{5} + \frac{4}{5}$  (add the numerators to numbers only)

$$= \frac{3+4}{5}$$

$$= \frac{7}{5}$$

( $\div$  = remainder)

$$= 1\frac{2}{5}$$



a)  $\frac{5}{12} + \frac{4}{12} =$  (add the numerators to numbers only)

$$= \frac{5+4}{12} = \frac{9}{12 \div 3} = \boxed{\frac{3}{4}}$$

b)  $\frac{2}{5} + \frac{2}{5} =$

$$= \dots = \boxed{\phantom{\frac{4}{5}}}$$

c)  $\frac{3}{11} + \frac{5}{11} =$

$$= \dots = \boxed{\phantom{\frac{8}{11}}}$$

d)  $\frac{2}{7} + \frac{4}{7} =$

$$= \dots = \boxed{\phantom{\frac{6}{7}}}$$

e)  $\frac{2}{13} + \frac{8}{13} =$

$$= \dots = \boxed{\phantom{\frac{10}{13}}}$$

f)  $\frac{4}{9} + \frac{1}{9} =$

$$= \dots = \boxed{\phantom{\frac{5}{9}}}$$

**Skill 9.1** Adding fractions with the same denominator (2).

**g)**  $\frac{4}{5} + \frac{4}{5} =$   
 $= \frac{4+4}{5} = \frac{8}{5}$

han e to  
mi ed number

$= 8 \div 5$

$= 1\frac{3}{5}$

**h)**  $\frac{5}{7} + \frac{4}{7} =$

=

=

=

**i)**  $\frac{7}{9} + \frac{7}{9} =$

=

=

=

**j)**  $\frac{7}{11} + \frac{9}{11} =$

=

=

**k)**  $\frac{10}{3} + \frac{1}{3} =$

=

=

**l)**  $\frac{9}{13} + \frac{11}{13} =$

=

=

**m)**  $\frac{5}{8} + \frac{7}{8} =$

$= \frac{5+7}{8} = \frac{12}{8}$

im lify

$= \frac{3}{2} = 3 \div 2$

=

**n)**  $\frac{3}{4} + \frac{3}{4} =$

=

=

**o)**  $\frac{5}{6} + \frac{5}{6} =$

=

=

han e to  
mi ed number

**p)**  $\frac{1}{8} + \frac{5}{8} =$

$= \frac{1+5}{8} = \frac{6}{8}$

=

**q)**  $\frac{1}{15} + \frac{2}{15} =$

=

=

**r)**  $\frac{1}{6} + \frac{1}{6} =$

=

=

**s)**  $\frac{3}{10} + \frac{2}{10} =$

=

**t)**  $\frac{5}{12} + \frac{3}{12} =$

=

=

**u)**  $\frac{7}{10} + \frac{1}{10} =$

=

**v)**  $\frac{1}{8} + \frac{3}{8} =$

=

**w)**  $\frac{5}{12} + \frac{5}{12} =$

=

=

**x)**  $\frac{2}{15} + \frac{10}{15} =$

=



**Skill 9.2 Subtracting fractions with the same denominator.**

- Subtract the numerators (top numbers of the fractions).
- Do not change the denominators.
- Simplify the resulting fraction and/or change it to a mixed number if necessary.  
(see skill 9.1, page 41)

**Q.**  $\frac{5}{8} - \frac{1}{8} =$

**A.**  $\frac{5}{8} - \frac{1}{8}$  *subtract the numerators to numbers only*

$$= \frac{5-1}{8}$$

$$= \frac{4}{8}$$

*simplify*

$$= \frac{4 \div 4}{8 \div 4}$$

$$= \frac{1}{2}$$

**a)**  $\frac{7}{11} - \frac{2}{11} =$  *subtract the numerators to numbers only*

$$= \frac{7-2}{11} = \boxed{\frac{5}{11}}$$

**b)**  $\frac{8}{9} - \frac{1}{9} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**c)**  $\frac{11}{13} - \frac{9}{13} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**d)**  $\frac{11}{5} - \frac{2}{5} =$

$$= \frac{11-2}{5} = \frac{9}{5}$$

*change to mixed number*

$$= 9 \div 5 = \boxed{1\frac{4}{5}}$$

**e)**  $\frac{8}{3} - \frac{1}{3} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**f)**  $\frac{20}{7} - \frac{2}{7} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**g)**  $\frac{7}{12} - \frac{5}{12} =$  *simplify*

$$= \frac{2}{12} = \frac{2 \div 2}{12 \div 2} = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**h)**  $\frac{13}{15} - \frac{8}{15} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**i)**  $\frac{5}{6} - \frac{1}{6} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**j)**  $\frac{9}{14} - \frac{5}{14} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**k)**  $\frac{11}{16} - \frac{5}{16} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**l)**  $\frac{9}{10} - \frac{1}{10} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**m)**  $\frac{11}{18} - \frac{7}{18} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**n)**  $\frac{9}{20} - \frac{3}{20} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

**o)**  $\frac{19}{24} - \frac{7}{24} =$

$$= \dots = \boxed{\phantom{\frac{\quad}{\quad}}}$$

# 10. [Fraction $\times, \div$ ]

## Skill 10.1 Multiplying a fraction by a whole number (1).

MM7 11 22 33 44  
MM8 11 22 33 44

- Multiply the numerator of the fraction by the whole number.
- Do not change the denominator.
- Simplify the resulting fraction and/or change it to a mixed number if necessary.

EITHER

- Cross simplify where possible before multiplying.

OR

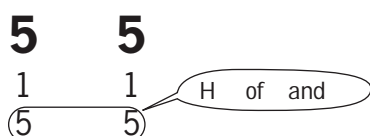
- Simplify at the end.

### To find the Highest Common Factor (HCF) of two numbers

- Write all the factors of each number (the factors must divide exactly into the number).
- Find the largest number that appears on both lists.

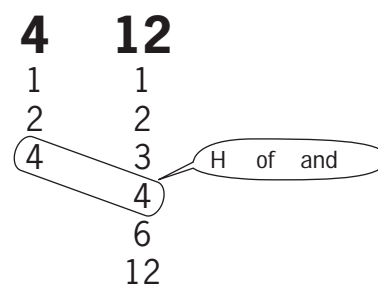
Hint: The Highest Common Factor is the largest number that divides evenly into both numbers.

#### HCF for Identical numbers



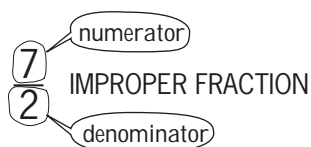
Hint: 5 is the HCF of 5 and 5 because 5 is the largest number that divides into 5 and 5.

#### HCF when one number divides evenly into the other number



Hint: 4 is the HCF of 4 and 12 because 4 is the largest number that divides into 4 and 12.

### To change an improper fraction to a mixed number



- Divide the numerator by the denominator.

$$\frac{7}{2} = 7 \div 2 = 3 \text{ remainder } 1$$

- Write the result as the whole number and the remainder over the denominator.

$$3 \text{ remainder } 1 = 3\frac{1}{2}$$

### To cross multiply a fraction and a whole number

- Simplify the denominator of the fraction and the whole number. This means to divide them by the same number, usually by their Highest Common Factor.
- Cross out the denominator of the fraction and the whole number.
- Write the result of the division next to each crossed number.
- Multiply the top numbers together.

$$\frac{3}{10} \times 5 = \frac{3}{\cancel{10} \div 5} \times \cancel{5} \div 5$$

(divide and by)

$$= \frac{3}{2} \times 1 = \frac{3}{2} = 1\frac{1}{2}$$

(÷ = ÷)

**Skill 10.1** Multiplying a fraction by a whole number (2).

MM7 11 22 33 44  
MM8 11 22 33 44

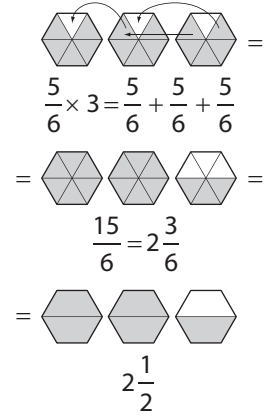
Q.  $\frac{5}{6} \times 3 =$

A.  $\frac{5}{\cancel{6}^2} \times \frac{1}{\cancel{3}_1} =$   
 $= \frac{5 \times 1}{2}$   
 $= \frac{5}{2}$   
 $= 2\frac{1}{2}$

*i ide and by*  
*han e to mi ed number*

OR A.  $\frac{5}{6} \times 3 =$   
 $= \frac{5 \times 3}{6}$   
 $= \frac{15}{6}$   
 $= 2\frac{3}{6}$   
 $= 2\frac{1}{2}$

*ulti ly by*  
*im lify*



a)  $9 \times \frac{2}{5} =$   
 $= \frac{9 \times 2}{5} = \frac{18}{5}$

*han e to mi ed number*

$= 18 \div 5 = 3\frac{3}{5}$

b)  $\frac{5}{6} \times 5 =$

$=$

c)  $3 \times \frac{5}{8} =$

$=$

d)  $\frac{4}{5} \times 3 =$

$=$

e)  $2 \times \frac{4}{7} =$

$=$

f)  $2 \times \frac{2}{9} =$

$=$

g)  $8 \times \frac{3}{4} =$   
 $= \frac{2}{\cancel{8}^4} \times \frac{3}{\cancel{4}_1}$

*i ide and by*

$= \frac{2 \times 3}{1} = 6$

h)  $\frac{5}{8} \times 2 =$

$=$

i)  $2 \times \frac{5}{12} =$

$=$

j)  $6 \times \frac{5}{12} =$

$=$

k)  $\frac{3}{7} \times 14 =$

$=$

l)  $\frac{3}{4} \times 20 =$

$=$

m)  $2 \times \frac{5}{6} =$

$=$

n)  $\frac{1}{4} \times 16 =$

$=$

o)  $12 \times \frac{3}{4} =$

$=$

**Skill 11.2** Finding the remaining percentage.

MM7 1 1 22 33 44  
MM8 1 1 22 33 44

- Subtract the given percentages from 100%, to find the remaining percentage.

**Q.** According to a projection for 2020, 39% of the population of the USA will be aged between 0 - 29 and 35% between 30 - 59. What percentage of the population will be aged 60 or more?

**A.**  $100\% - 39\% - 35\%$   
 $= 100\% - 74\%$   
 $= 26\%$

**a)** Approximately 59% of the athletes at the 2000 Sydney Olympics were male. What percentage of the athletes were female?

$100\% - 59\% = 41\%$

**b)** School is approximately 60% of the calendar year in the Russian Federation. What percentage do holidays account for?

$100\% - 60\% = \boxed{\phantom{00}}$

**c)** The green-yellow 18-carat gold is 75% gold and the rest is silver. What percentage is silver?

$\phantom{100\% - 75\%} = \boxed{\phantom{00}}$

**d)** If 89% of the West Point military academy graduates are male, what percentage are females?

$\phantom{100\% - 89\%} = \boxed{\phantom{00}}$

**e)** If 78% of the Supreme Court justices are male, what percentage are females?

$\phantom{100\% - 78\%} = \boxed{\phantom{00}}$

**f)** If the cucumber is 96% water, what percentage do the other components equal?

$\phantom{100\% - 96\%} = \boxed{\phantom{00}}$

**g)** In Mali 72% of people earn less than \$1 a day. What percentage of people earn more than \$1 a day?

$\phantom{100\% - 72\%} = \boxed{\phantom{00}}$

**h)** If 37.5% of the adult teeth are incisors and canines, what percentage is formed by molars and pre-molars?

$\phantom{100\% - 37.5\%} = \boxed{\phantom{00}}$

**i)** Approximately 60.5% of the world population lives in Asia and 13.5% lives in North and South America. What percentage of the population lives in the rest of the world?

$100\% - 60.5\% - 13.5\% = \boxed{\phantom{00}}$

**j)** Approximately 27.2% of the world population is aged between 0 and 14 years and 65.2% between 15 and 64 years. What percentage of the population is aged 65 years and over?

$\phantom{100\% - 27.2\% - 65.2\%} = \boxed{\phantom{00}}$

**k)** If England occupies 57% and Scotland occupies 34% of Great Britain (the main island of the United Kingdom), what percentage is occupied by Wales?

$\phantom{100\% - 57\% - 34\%} = \boxed{\phantom{00}}$

**l)** At the 2012 London Olympics, 20% of the medals won by Australia were gold, and 46% were silver. What percentage of the medals were bronze?

$\phantom{100\% - 20\% - 46\%} = \boxed{\phantom{00}}$

### Skill 12.4 Reading decimal numbers on a scale (1).

#### To read a scale with marks between the whole numbers

- Count the spaces between two consecutive whole numbers on the scale.
- Work out the value of each space.

Examples:

1) 10 spaces  $\Rightarrow 1 \div 10 = \frac{1}{10} = 0.1$

Each mark is further along the scale by one tenth or 0.1

2) 5 spaces  $\Rightarrow 1 \div 5 = \frac{1}{5} = 0.2$

Each mark is further along the scale by one tenth or 0.2

3) 4 spaces  $\Rightarrow 1 \div 4 = \frac{1}{4} = 0.25$

Each mark is further along the scale by one tenth or 0.25

- Starting at the last whole number, count on by the value of each space.

#### To read a scale with marks halfway between decimal numbers

Examples:

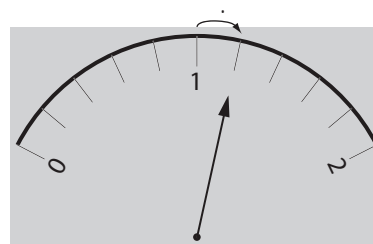
1) mark halfway between 0.1 and 0.2  
 $\Rightarrow 0.15$

2) mark halfway between 0.01 and 0.02  
 $\Rightarrow 0.015$

Q. What decimal number is shown on this meter?

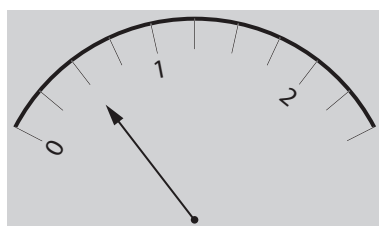


A. 1.2



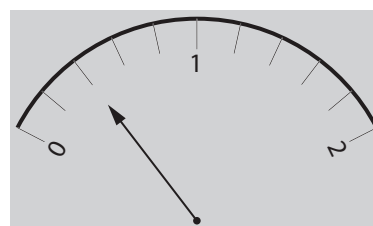
There are 5 spaces between 1 and 2.  
Each space equals 0.2

a) What decimal number is shown on this meter?

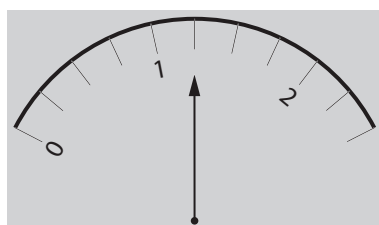


0.5

b) What decimal number is shown on this meter?



c) What decimal number is shown on this meter?



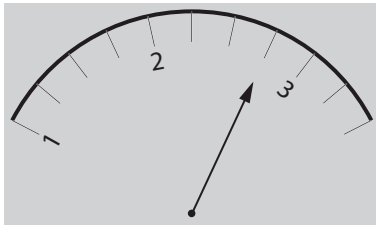
d) What decimal number is shown on this meter?



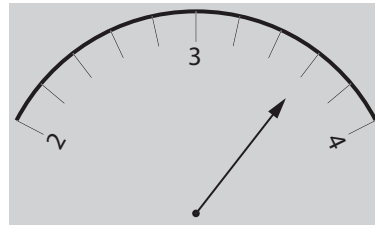
**Skill 12.4** Reading decimal numbers on a scale (2).

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

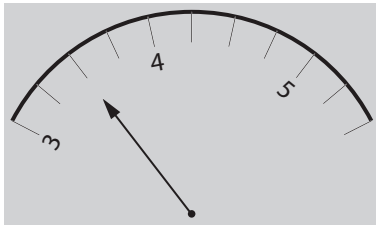
**e)** What decimal number is shown on this meter?



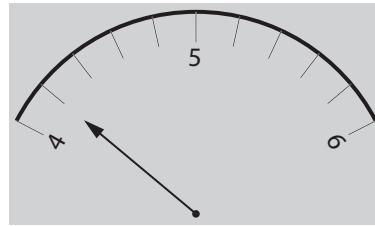

**f)** What decimal number is shown on this meter?



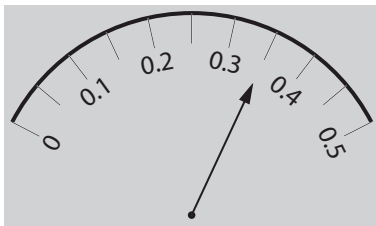

**g)** What decimal number is shown on this meter?



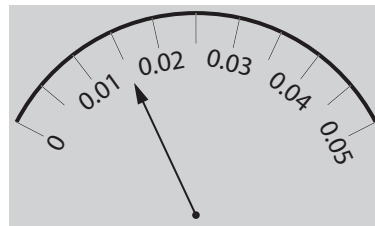

**h)** What decimal number is shown on this meter?



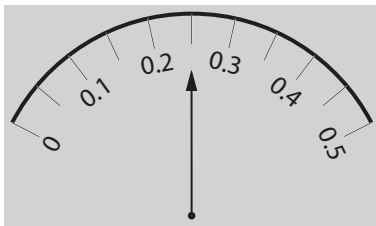

**i)** What decimal number is shown on this meter?



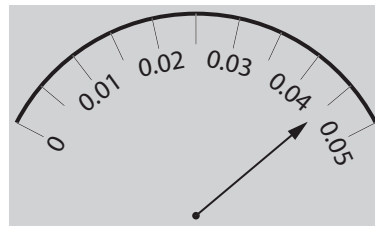

**j)** What decimal number is shown on this meter?



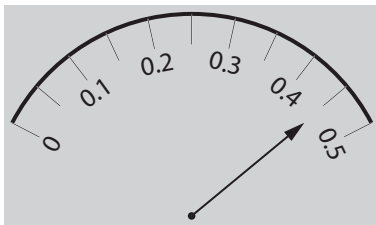

**k)** What decimal number is shown on this meter?



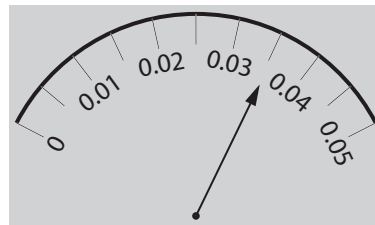

**l)** What decimal number is shown on this meter?




**m)** What decimal number is shown on this meter?




**n)** What decimal number is shown on this meter?



# 13. [Integers]

## Skill 13.1 Comparing and ordering integers (1).

MM7 11 22 33 44  
MM8 11 22 33 44

- Use a number line.

Hint: Numbers decrease as you move to the left or down and increase as you move to the right or up.

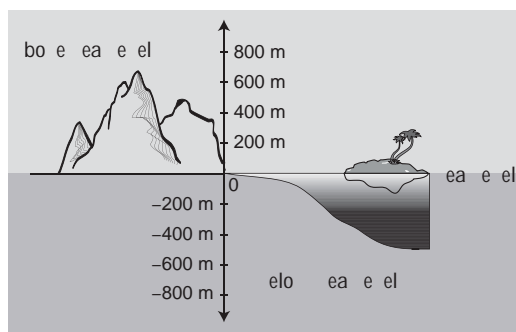
### NUMBER LINE

A negative number is always smaller than a positive number.



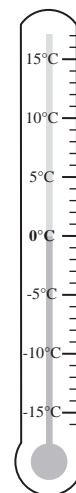
### ALTITUDE

An altitude is lower when further down, below sea level (BSL) and higher when further up, above sea level (ASL).



### TEMPERATURE

Temperatures below zero are lower than temperatures above zero.

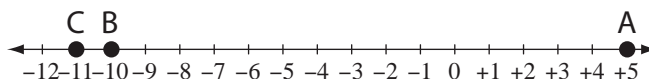


**Q.** Who won the 2010 Women's British Open Golf Tournament?

[Hint: In golf the lowest score wins.]

- A) +5 K. Webb
- B) -10 K. Hull
- C) -11 Y. Tseng

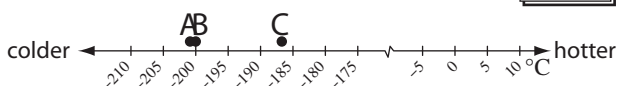
**A. C** Find the lowest score to determine the winner.



**a)** Which of Saturn's moons has the highest temperature?

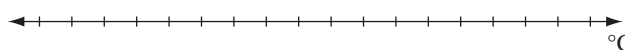
- A) -201°C Enceladus
- B) -200°C Mimas
- C) -187°C Tethys

**C**



**b)** Which temperature for oxygen is higher?

- A) -183°C boiling point
- B) -218°C melting point



**c)** Who won the 2010 British Open Golf Tournament?

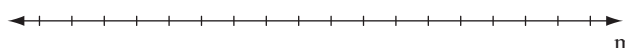
[Hint: In golf the lowest score wins.]

- A) -16 L. Oosthuizen
- B) +3 P. Senior
- C) -2 R. Allenby



**d)** Which body of water is at the lowest altitude?

- A) -28 m Caspian Sea
- B) -408 m Dead Sea
- C) -15 m Lake Eyre

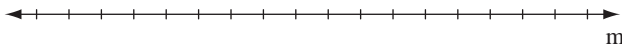


**Skill 13.1 Comparing and ordering integers (2).**

MM7 11 22 33 44  
MM8 11 22 33 44

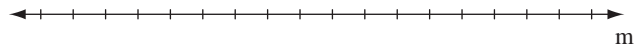
**e)** Which location has the lowest altitude?

- A) 3 m above sea level  
Amsterdam (Netherlands)
- B) 133 m below sea level  
Qattara Depression (Egypt)
- C) 2430 m above sea level  
Machu Picchu (Peru)



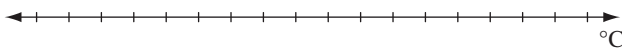
**f)** Which location has the highest altitude?

- A) 10 m below sea level  
Laguna Salada (Mexico)
- B) 7 m below sea level  
Lammefjord (Denmark)
- C) 19 m above sea level  
Vatican City (Italy)



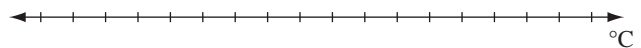
**g)** Which location recorded the lowest temperature?

- A)  $-25.6^{\circ}\text{C}$  Kabul
- B)  $+14.1^{\circ}\text{C}$  Christmas Island
- C)  $-15.2^{\circ}\text{C}$  La Paz



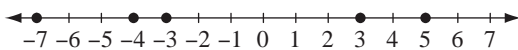
**h)** Which continent has the lowest recorded temperature?

- A)  $-63^{\circ}\text{C}$  North America
- B)  $-23^{\circ}\text{C}$  Australia
- C)  $-55^{\circ}\text{C}$  Europe



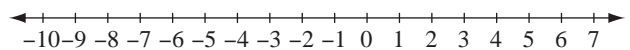
**i)** Arrange in ascending order:

$-4, -7, 5, -3, 3$



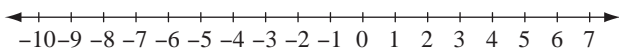

**j)** Arrange in order from largest to smallest:

$0, 8, -9, 6, -4$



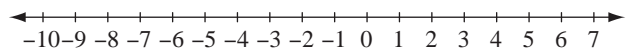

**k)** Arrange in descending order:

$-10, 8, 1, -8, 4$



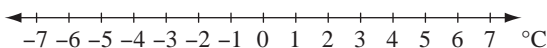

**l)** Arrange in order from smallest to largest:

$-2, -6, 0, -3, 5$



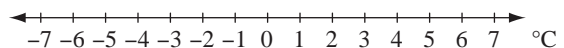

**m)** Arrange in order from coldest to warmest:

$2^{\circ}\text{C}, -3^{\circ}\text{C}, 4^{\circ}\text{C}, -5^{\circ}\text{C}$




**n)** Arrange in order from warmest to coldest:

$-1^{\circ}\text{C}, -5^{\circ}\text{C}, 5^{\circ}\text{C}, -3^{\circ}\text{C}$





**Skill 13.2** Comparing integers using 'less than' and 'greater than'.

MM7 11 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

- Use a number line.

Hint: The greater the negative number is always smaller than a positive number.

The larger the negative number the lesser the value e.g.  $-8$  is less than  $< -6$

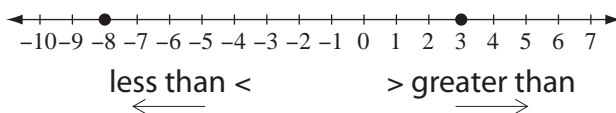
The smaller the negative number the greater the value e.g.  $-2$  is greater than  $> -5$

**Q.** Use  $<$  or  $>$  to make a true statement.

$$3 \quad \square \quad -8$$

**A.**  $3 > -8$

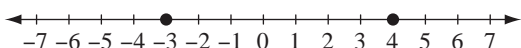
3 is greater than  $-8$



**a)** Use  $<$  or  $>$  to make a true statement.

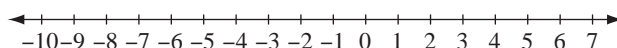
a negative number is less than a positive number

$$-3 \quad \square \quad 4$$



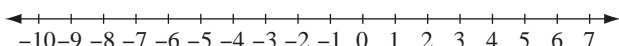
**b)** Use  $<$  or  $>$  to make a true statement.

$$-5 \quad \square \quad 0$$



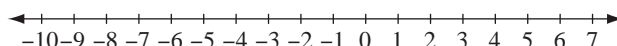
**c)** Use  $<$  or  $>$  to make a true statement.

$$-4 \quad \square \quad -9$$



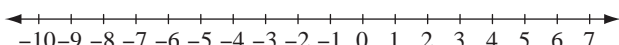
**d)** Use  $<$  or  $>$  to make a true statement.

$$-6 \quad \square \quad 3$$



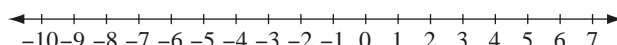
**e)** Use  $<$  or  $>$  to make a true statement.

$$2 \quad \square \quad -1$$



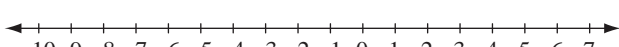
**f)** Use  $<$  or  $>$  to make a true statement.

$$-3 \quad \square \quad -7$$



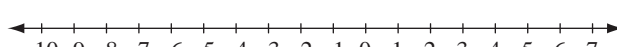
**g)** Use  $<$  or  $>$  to make a true statement.

$$-9 \quad \square \quad 0$$



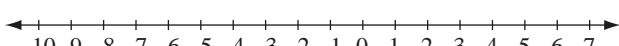
**h)** Use  $<$  or  $>$  to make a true statement.

$$3 \quad \square \quad -5$$



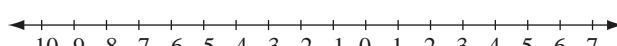
**i)** Use  $<$  or  $>$  to make a true statement.

$$4 \quad \square \quad -7$$



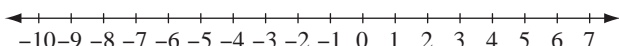
**j)** Use  $<$  or  $>$  to make a true statement.

$$-4 \quad \square \quad -2$$



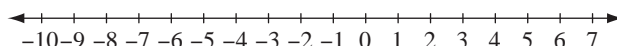
**k)** Use  $<$  or  $>$  to make a true statement.

$$-8 \quad \square \quad -5$$



**l)** Use  $<$  or  $>$  to make a true statement.

$$-2 \quad \square \quad -4$$



# 14. [Rates / Ratios]

## Skill 14.1 Simplifying ratios by comparing two numbers.

MM7 1 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

EITHER

- Find the largest number that divides evenly into each number of the ratio (Highest Common Factor).
- Divide each number by the HCF.

Hint: : means fraction and is read as to .

$$a : b = \frac{a}{b}$$

OR

- Divide each number of the ratio by any factor until the ratio is reduced to simplest form.

Q. Simplify the ratio 32 : 56

A.  $\begin{matrix} \div 8 & & \div 8 \\ \swarrow & & \searrow \\ 32 : 56 \\ \swarrow & & \searrow \\ 4 & & 7 \\ \hline 4 : 7 \end{matrix}$

H of and is so ÷

OR A.  $\begin{matrix} \div 2 & & \div 2 \\ \swarrow & & \searrow \\ 32 : 56 \\ \swarrow & & \searrow \\ 16 : 28 \\ \swarrow & & \searrow \\ 8 : 14 \\ \swarrow & & \searrow \\ 4 : 7 \\ \hline 4 : 7 \end{matrix}$

im lify: ÷  
im lify: ÷  
im lify: ÷

a) Simplify the ratio 4 : 6

$$= \overset{2}{\cancel{4}} : \overset{3}{\cancel{6}} \xrightarrow{\text{im lify: } \div} = \boxed{2 : 3}$$

b) Simplify the ratio 6 : 12

$$= 6 : 12 \xrightarrow{\text{im lify: } \div} = \boxed{\quad : \quad}$$

c) Simplify the ratio 30 : 50

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

d) Simplify the ratio 10 : 15

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

e) Simplify the ratio 45 : 15

$$= \overset{3}{\cancel{45}} : \overset{1}{\cancel{15}} \xrightarrow{\text{im lify: } \div} = \boxed{\quad : \quad}$$

f) Simplify the ratio 18 : 24

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

g) Simplify the ratio 100 : 70

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

h) Simplify the ratio 32 : 8

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

i) Simplify the ratio 24 : 96

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

j) Simplify the ratio 30 : 54

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

k) Simplify the ratio 27 : 36

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

l) Simplify the ratio 24 : 16

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

m) Simplify the ratio 150 : 45

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

n) Simplify the ratio 90 : 240

$$= \underline{\hspace{2cm}} = \boxed{\quad : \quad}$$

**Skill 14.2** Simplifying ratios by comparing two quantities.

- Write the quantities of the ratio with the same unit of measurement.

EITHER

- Find the largest number that divides evenly into each quantity of the ratio (Highest Common Factor).
- Divide each quantity by the HCF.

Hints: The order of the quantities in a ratio matters.

: means fraction and is read as to .

Examples: The ratio of legs to ears in a cat is : = :

The ratio of ears to legs in a cat is : = :

OR

- Divide each quantity of the ratio by any factor until the ratio is reduced to simplest form.

ratio  $a : b = \frac{a}{b}$

**Q.** Simplify the ratio 2 h : 40 min

**A.**  $2\text{ h} = 2 \times 60\text{ min} = 120\text{ min}$  (h = min)  
 $2\text{ h} : 40\text{ min}$   
 $= \frac{120\text{ min} : 40\text{ min}}{\div 40} = \frac{3}{1} = 3 : 1$  (H of and is so ÷)  
 = **3 : 1** (ignore the units)

**a)** Simplify the ratio 48 kg : 80 kg  
 $= \frac{48}{80} = \frac{3}{5}$  (simplify: ÷) =  :

**b)** Simplify the ratio 50 m : 125 m  
 $= \frac{50}{125} = \frac{2}{5}$  (simplify: ÷) =  :

**c)** Simplify the ratio 120 cm : 36 cm  
 $= \frac{120}{36} = \frac{10}{3}$  =  :

**d)** Simplify the ratio 150 g : 175 g  
 $= \frac{150}{175} = \frac{6}{7}$  =  :

**e)** Simplify the ratio \$3.00 : 40 cents  
 $\$3.00 = 3.00 \times 100\text{¢} = 300\text{¢}$  (convert dollars to cents)  
 $= \frac{300\text{¢}}{40\text{¢}} = \frac{15}{2} = 15 : 2$  (simplify: ÷) =  :

**f)** Simplify the ratio 40 s : 2 min  
 $= \frac{40\text{ s}}{2 \times 60\text{ s}} = \frac{40}{120} = \frac{1}{3}$  =  :

**g)** Simplify the ratio 12 m : 60 cm  
 $= \frac{12 \times 100\text{ cm}}{60\text{ cm}} = \frac{1200}{60} = 20 : 1$  =  :

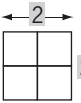
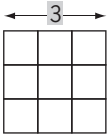
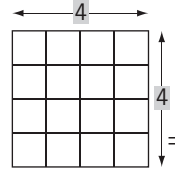
**h)** Simplify the ratio \$4.00 : 25 cents  
 $= \frac{4.00 \times 100\text{¢}}{25\text{¢}} = \frac{400}{25} = 16 : 1$  =  :

**i)** Simplify the ratio 6 days : 4 weeks  
 $= \frac{6 \times 7\text{ days}}{4 \times 7\text{ days}} = \frac{42}{28} = \frac{3}{2} = 3 : 2$  =  :

**j)** Simplify the ratio 5 min : 50 s  
 $= \frac{5 \times 60\text{ s}}{50\text{ s}} = \frac{300}{50} = 6 : 1$  =  :

### Skill 15.2 Squaring whole numbers.

- Multiply the number by itself.

$1^2$ = one squared  $= \square 1 = 1 \text{ square}$ $= 1 \times 1$ $= \mathbf{1}$	$2^2$ = two squared   $= 2 \times 2$ $= \mathbf{4}$	$3^2$ = three squared   $= 3 \times 3$ $= \mathbf{9}$	$4^2$ = four squared   $= 4 \times 4$ $= \mathbf{16}$
--	--	--	--

Q.  $90^2 =$

A.  $90^2 =$   
 $= 90 \times 90$   
 $= \mathbf{8100}$

multi lied by itself times

$$\begin{array}{r} 8 \phantom{0} \\ \times 90 \\ \hline 8100 \end{array}$$

<p>a) <math>7^2 =</math> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">multi lied by itself times</span></p> <p><math>= 7 \times 7</math>      <math>= \boxed{49}</math></p>	<p>b) <math>3^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>c) <math>2^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>
<p>d) <math>10^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>e) <math>5^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>f) <math>1^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>
<p>g) <math>12^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>h) <math>11^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>i) <math>0^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>
<p>j) <math>4^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>k) <math>9^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>l) <math>20^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>
<p>m) <math>50^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>n) <math>30^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>o) <math>70^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>
<p>p) <math>80^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>q) <math>40^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>	<p>r) <math>60^2 =</math></p> <p><math>= \dots</math>      <math>= \boxed{\phantom{00}}</math></p>

**Skill 16.2** Using 'order of operations' mixing  $\times$ ,  $\div$ ,  $+$  and/or  $-$

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

**Order of operations rules**

Multiply ( $\times$ ) and/or divide ( $\div$ ) in order from left to right.  
Add ( $+$ ) and/or subtract ( $-$ ) in order from left to right.

**Q.**  $3 + 24 \div 4 \times 2 =$

**A.**  $3 + 24 \div 4 \times 2 =$  *work from left to right*  
 $= 3 + 6 \times 2$  *divide first*  
 $= 3 + 12$   
 $= 15$

**a)**  $2 + 3 \times 5 =$  *multiply first*  
 $= 2 + 15$   
 $= 17$

**b)**  $6 + 9 \div 3 =$   
 $= 6 + 3$   
 $= 9$

**c)**  $4 \times 3 - 7 =$   
 $= 12 - 7$   
 $= 5$

**d)**  $2 + 7 \times 4 =$   
 $= 2 + 28$   
 $= 30$

**e)**  $14 - 12 \div 2 =$   
 $= 14 - 6$   
 $= 8$

**f)**  $2 \times 5 + 8 =$   
 $= 10 + 8$   
 $= 18$

**g)**  $18 \div 6 - 3 =$   
 $= 3 - 3$   
 $= 0$

**h)**  $9 + 8 \div 4 =$   
 $= 9 + 2$   
 $= 11$

**i)**  $36 - 6 \times 5 =$   
 $= 36 - 30$   
 $= 6$

**j)**  $14 + 21 \div 7 =$   
 $= 14 + 3$   
 $= 17$

**k)**  $5 + 4 \times 9 =$   
 $= 5 + 36$   
 $= 41$

**l)**  $17 - 12 \div 3 =$   
 $= 17 - 4$   
 $= 13$

**m)**  $6 + 15 \div 3 \times 2 =$  *divide first*  
 $= 6 + 5 \times 2$   
 $= 6 + 10$   
 $= 16$

**n)**  $9 \times 5 - 4 \times 6 =$   
 $= 45 - 24$   
 $= 21$

**o)**  $19 + 16 - 4 \times 7 =$   
 $= 19 + 16 - 28$   
 $= 7$

**p)**  $21 \div 3 - 15 \div 5 =$   
 $= 7 - 3$   
 $= 4$

**q)**  $28 + 9 - 7 \times 3 =$   
 $= 28 + 9 - 21$   
 $= 16$

**r)**  $4 \times 8 - 18 \div 2 =$   
 $= 32 - 9$   
 $= 23$

**s)**  $5 + 48 \div 8 \times 3 =$   
 $= 5 + 6 \times 3$   
 $= 5 + 18$   
 $= 23$

**t)**  $10 \times 2 - 44 \div 11 =$   
 $= 20 - 4$   
 $= 16$

**u)**  $22 - 3 \times 6 + 9 =$   
 $= 22 - 18 + 9$   
 $= 13$

**Skill 17.2** Understanding and finding the place value of a digit in a number (1). MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

- Compare the position of the digit to the position of the decimal point.  
Hint: There is a decimal point which is not written, at the end of any whole number.

Place value	tens of thousands	thousands	hundreds	tens	units	tenths	hundredths	thousandths
Value	30 000	6 000	100	50	8	$\frac{2}{10}$	$\frac{4}{100}$	$\frac{7}{1000}$
	<b>3</b>	<b>6</b>	<b>1</b>	<b>5</b>	<b>8</b>	.	<b>2</b>	<b>4</b>

↑  
Decimal point

**Q.** What is the value of the underlined digit in the number 36 158.247? **A.** 30 000 Consider the position of the digit 3 to that of the decimal point. 3 is five places to the left so it is in the tens of thousands place. The 3 represents 3 tens of thousands or 30 000

- |  |  |
|--|--|
| <p><b>a)</b> In the number 14058 which digit is in the tens place? <span style="float: right; border: 1px solid black; padding: 2px 10px;">5</span></p>                      | <p><b>b)</b> In the number 9023 which digit is in the units place? <span style="float: right; border: 1px solid black; padding: 2px 10px;"></span></p>               |
| <p><b>c)</b> In the number 5836 which digit is in the hundreds place? <span style="float: right; border: 1px solid black; padding: 2px 10px;"></span></p>                    | <p><b>d)</b> In the number 24 108 which digit is in the thousands place? <span style="float: right; border: 1px solid black; padding: 2px 10px;"></span></p>         |
| <p><b>e)</b> In the number 16.253 which digit is in the units place? <span style="float: right; border: 1px solid black; padding: 2px 10px;"></span></p>                     | <p><b>f)</b> In the number 0.017 which digit is in the hundredths place? <span style="float: right; border: 1px solid black; padding: 2px 10px;"></span></p>         |
| <p><b>g)</b> In the number 45.809 which digit is in the tenths place? <span style="float: right; border: 1px solid black; padding: 2px 10px;"></span></p>                    | <p><b>h)</b> In the number 0.0874 which digit is in the thousandths place? <span style="float: right; border: 1px solid black; padding: 2px 10px;"></span></p>       |
| <p><b>i)</b> What is the value of the underlined digit in the number <u>2</u>59?<br/><i>5 tens</i> ⇒ <span style="border: 1px solid black; padding: 2px 10px;">50</span></p> | <p><b>j)</b> What is the value of the underlined digit in the number 3<u>2</u>70?<br/>..... ⇒ <span style="border: 1px solid black; padding: 2px 10px;"></span></p>  |
| <p><b>k)</b> What is the value of the underlined digit in the number 16<u>0</u>92?<br/>..... ⇒ <span style="border: 1px solid black; padding: 2px 10px;"></span></p>         | <p><b>l)</b> What is the value of the underlined digit in the number 86<u>9</u>25?<br/>..... ⇒ <span style="border: 1px solid black; padding: 2px 10px;"></span></p> |

**Skill 17.2** Understanding and finding the place value of a digit in a number (2).

m) What is the value of the underlined digit in the number 5124?

⇒

n) What is the value of the underlined digit in the number 73061?

⇒

o) What is the value of the underlined digit in the number 29 603?

⇒

p) What is the value of the underlined digit in the number 8714?

⇒

q) What is the value of the underlined digit in the number 35.043?

$4 \text{ hundredths} = \frac{4}{100} =$

r) What is the value of the underlined digit in the number 5.082?

$2 \text{ thousandths} =$

s) What is the value of the underlined digit in the number 0.98?

=

t) What is the value of the underlined digit in the number 1.076?

=

u) In which number does the digit 4 have greater value?  
A) 4.65  
B) 30.4

A) value 4

B) value 0.4       $4 > 0.4 \Rightarrow$

v) In which number does the digit 6 have greater value?  
A) 20406  
B) 1063

A)

B)  $\Rightarrow$

w) In which number does the digit 1 have greater value?  
A) 3.15  
B) 1.98

A)

B)  $\Rightarrow$

x) In which number does the digit 9 have greater value?  
A) 4907  
B) 10892

A)

B)  $\Rightarrow$

y) In which number does the digit 3 have greater value?  
A) 8.931  
B) 1.375

A)

B)  $\Rightarrow$

z) In which number does the digit 5 have greater value?  
A) 0.652  
B) 0.526

A)

B)  $\Rightarrow$

**Skill 18.2** Finding the common multiples of two numbers.

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

- List the multiples of each number.
- Compare the lists to find any numbers the same (common multiples).

**Q.** List the common multiples of 4 and 5 up to 50.

**A.** *Multiples of 4:*  
4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52  
*Multiples of 5:*  
5, 10, 15, 20, 25, 30, 35, 40, 45, 50  
*Common multiples of 4 and 5 up to 50:*  
⇒ 20, 40

**a)** List the common multiples of 3 and 6 up to 20.

3, 6, 9, 12, 15, 18 multiples of

6, 12, 18 multiples of

6, 12, 18

**b)** List the common multiples of 4 and 7 up to 30.

.....

.....

**c)** List the common multiples of 2 and 9 up to 60.

.....

.....

**d)** List the common multiples of 6 and 8 up to 50.

.....

.....

**e)** List the common multiples of 4 and 6 up to 32.

.....

.....

**f)** List the common multiples of 3 and 8 up to 60.

.....

.....

**g)** List the common multiples of 5 and 8 up to 90.

.....

.....

**h)** List the common multiples of 7 and 9 up to 100.

.....

.....



**Skill 18.3** Finding the lowest common multiple (LCM) of two numbers.

MM7 1 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

- List the multiples of each number.
- Compare the lists and find the lowest matching number (Lowest Common Multiple, LCM).  
Hints: If one number divides evenly into the other number then the larger number is the LCM.  
If two numbers have only 1 as their only common factor then the LCM is their product.

**Q.** What is the lowest common multiple (LCM) of 10 and 12?

**A.** *Multiples of 10:*  
10, 20, 30, 40, 50, 60, 70, 80  
*Multiples of 12:*  
12, 24, 36, 48, 60, 72, 84  
*Lowest Common Multiple (LCM):*  
**60**

**a)** What is the lowest common multiple (LCM) of 3 and 8?

3, 6, 9, 12, 15, 18, 21, 24, 27 multiples of

8, 16, 24, 32 multiples of 24

**b)** What is the lowest common multiple (LCM) of 4 and 7?

.....

**c)** What is the lowest common multiple (LCM) of 2 and 11?

.....

**d)** What is the lowest common multiple (LCM) of 5 and 9?

.....

**e)** What is the lowest common multiple (LCM) of 3 and 18?

.....

**f)** What is the lowest common multiple (LCM) of 4 and 20?

.....

**g)** What is the lowest common multiple (LCM) of 6 and 12?

.....

**h)** What is the lowest common multiple (LCM) of 6 and 8?

.....

**i)** What is the lowest common multiple (LCM) of 8 and 12?

.....

**j)** What is the lowest common multiple (LCM) of 9 and 15?

.....

# 19. [Number Patterns]

## Skill 19.1 Completing number patterns by adding the same number.

MM7 1 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

- Look at consecutive terms of the pattern.
- Find the number and operation (in this case addition) used to get from one term to the next.
- Define the rule of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

**Q.** Complete the pattern:

2, 11, 20, 29,

**A.** 2, 11, 20, 29,  First note that each term in the pattern is increasing.

$$\begin{array}{ccc} \curvearrowright & \curvearrowright & \curvearrowright \\ +9 & +9 & +9 \end{array}$$

**Rule:** Add 9 to each term.

$$29 + 9 = 38$$

$$38 + 9 = 47$$

2, 11, 20, 29, **38, 47**

Then find by how much.

**a)** Complete the pattern:

0, 4, 8, 16,

$$\begin{array}{ccccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & & & \\ +4 & +4 & +4 & +4 & & & \\ & & & & \curvearrowright & & \\ & & & & +4 & & \end{array}$$

$16 + 4 = 20, \quad 20 + 4 = 24$

**b)** Complete the pattern:

1, 4, 7, 10, 13,

$$\begin{array}{ccccccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & & \\ +3 & +3 & +3 & +3 & +3 & & \\ & & & & & \curvearrowright & \\ & & & & & +3 & \end{array}$$

**c)** Complete the pattern:

3, 8, 13, 18, 23,

**d)** Complete the pattern:

3, 5, 7, 9, 11,

**e)** Complete the pattern:

2, 5, 8, 11,

**f)** Complete the pattern:

3, 7, 11, 15,

**g)** Complete the pattern:

3, 11, 19, 27,

**h)** Complete the pattern:

2, 9, 16, 23,

**i)** Complete the pattern:

2, 8, 14, 20,

**j)** Complete the pattern:

5, 14, 23, 32,

**Skill 19.2** Completing number patterns by subtracting the same number.

- Look at consecutive terms of the pattern.
- Find the number and operation (in this case subtraction) used to get from one term to the next.
- Define the rule of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

**Q.** Complete the pattern:

45, 36, 27, 18,

**A.** 45, 36, 27, 18,

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \\ -9 & -9 & -9 & \end{array}$

**Rule:** Subtract 9 from each term.

$18 - 9 = 9$

$9 - 9 = 0$

45, 36, 27, 18, **9, 0**

First note that each term in the pattern is decreasing. Then find by how much.

**a)** Complete the pattern:

18, 15, 12, 9,

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ -3 & -3 & -3 & -3 \end{array}$

$9 - 3 = 6, \quad 6 - 3 = 3$

**b)** Complete the pattern:

16, 14, 12, 10, 8,

$\begin{array}{cccc} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ -2 & -2 & -2 & -2 \end{array}$

**c)** Complete the pattern:

20, 17, 14, 11, 8,

**d)** Complete the pattern:

35, 30, 25, 20, 15,

**e)** Complete the pattern:

30, 26, 22, 18, 14,

**f)** Complete the pattern:

38, 32, 26, 20,

**g)** Complete the pattern:

98, 88, 78, 68,

**h)** Complete the pattern:

38, 31, 24, 17,

**i)** Complete the pattern:

42, 34, 26, 18,

**j)** Complete the pattern:

50, 41, 32, 23,

**Skill 19.3** Completing number patterns by adding or subtracting decimal numbers.

MM7 11 22 33 44  
MM8 11 22 33 44

- Look at consecutive terms of the pattern.
- Find the number and operation used to get from one term to the next.
- Define the rule of the pattern.
- Apply this rule to the last given term and find the next two terms of the pattern.

**Q.** Complete the pattern:

0.8, 1, 1.2, 1.4,

**A.** 0.8, 1, 1.2, 1.4, \_\_\_, \_\_\_

$$+0.2 +0.2 +0.2$$

**Rule:** Add 0.2 to each term.

$$1.4 + 0.2 = 1.6$$

$$1.6 + 0.2 = 1.8$$

0.8, 1, 1.2, 1.4, **1.6, 1.8**

First note that each term in the pattern is increasing. Then find by how much.

**a)** Complete the pattern:

0.2, 0.8, 1.4, 2,

$$+0.6 +0.6 +0.6+0.6 +0.6$$

.....  
 $2 + 0.6 = 2.6, \quad 2.6 + 0.6 = 3.2$

**b)** Complete the pattern:

1.8, 1.5, 1.2, 0.9,

$$-0.3 -0.3 -0.3 -0.3 -0.3$$

**c)** Complete the pattern:

1.5, 1.7, 1.9, 2.1, 2.3,

**d)** Complete the pattern:

1, 1.5, 2, 2.5,

**e)** Complete the pattern:

1, 1.4, 1.8, 2.2, 2.6,

**f)** Complete the pattern:

3.1, 2.9, 2.7, 2.5,

**g)** Complete the pattern:

2.9, 2.6, 2.3, 2,

**h)** Complete the pattern:

1, 2.1, 3.2, 4.3,

**i)** Complete the pattern:

0.8, 1.4, 2, 2.6,

**j)** Complete the pattern:

2.9, 2.5, 2.1, 1.7,

# 20. [Expressions]

**Skill 20.1** Simplifying expressions by adding and subtracting like terms (coefficient = 1).

MM7 11 22 33 44  
MM8 11 22 33 44

- Add or subtract, as instructed, all like terms. (see Glossary, page 346)
- In your answer, write the coefficient (number) first followed by the variable (letter) (see glossary, pages 330 and 375)

Hint: In the term  $m$ , 1 is the coefficient:  $m = 1 \times m$

**Q.** Simplify  $kl + kl + kl - kl + kl$       **A.**  $kl + kl + kl \rightarrow \cancel{kl} + \cancel{kl}$  cancel first  
 $= 3kl$

coefficient first

**a)** Simplify  $n + n + n + n$        $4n$       **b)** Simplify  $a + a$             **c)** Simplify  $u + u$      

**d)** Simplify  $t + t + t$             **e)** Simplify  $w + w + w + w$             **f)** Simplify  $z + z + z + z + z$      

**g)** Simplify  $x - x + x$             **h)** Simplify  $b + b + b - b$             **i)** Simplify  $e + e - e + e$      

**j)** Simplify  $k + k + k + k - k - k$             **k)** Simplify  $p + p - p - p + p$             **l)** Simplify  $c - c + c - c + c + c$      

**m)** Simplify  $ab + ab$             **n)** Simplify  $hi + hi + hi$             **o)** Simplify  $fg + fg + fg + fg$      

**p)** Simplify  $op + op + op + op$             **q)** Simplify  $tu + tu + tu + tu + tu$             **r)** Simplify  $uv + uv - uv + uv$      

**s)** Simplify  $ab - ab + ab + ab - ab$             **t)** Simplify  $wx + wx - wx + wx + wx$             **u)** Simplify  $de + de - de + de - de + de$

**Skill 21.3** Substituting one value into expressions involving +, −, × and ÷

- Replace the letter (variable) with the given value.
- First multiply ( × ) and/or divide ( ÷ ) from left to right.
- Finally add ( + ) and/or subtract ( − ) from left to right.

**Q.** If  $q = 8$ , find the value of  $4q + 2$

**A.**  $4q + 2$  substitute =  
 $= 4 \times 8 + 2$   
 $= 32 + 2$   
 $= 34$

**a)** If  $w = 6$ , find the value of  $20 - 3w$

$= 20 - 3 \times 6$  o × first  
 $= 20 - 18 = \boxed{2}$

**b)** If  $x = 2$ , find the value of  $5x + 1$

$=$   
 $=$   $\boxed{\phantom{00}}$

**c)** If  $m = 3$ , find the value of  $2 + 3m$

$=$   
 $=$   $\boxed{\phantom{00}}$

**d)** If  $x = 5$ , find the value of  $12 + 5x$

$=$   
 $=$   $\boxed{\phantom{00}}$

**e)** If  $a = 4$ , find the value of  $6 + 4a$

$=$   
 $=$   $\boxed{\phantom{00}}$

**f)** If  $b = 7$ , find the value of  $2b + 9$

$=$   
 $=$   $\boxed{\phantom{00}}$

**g)** If  $s = 3$ , find the value of  $7 + 11s$

$=$   
 $=$   $\boxed{\phantom{00}}$

**h)** If  $v = 4$ , find the value of  $9v - 8$

$=$   
 $=$   $\boxed{\phantom{00}}$

**i)** If  $h = 4$ , find the value of  $3h - 7$

$=$   
 $=$   $\boxed{\phantom{00}}$

**j)** If  $k = 7$ , find the value of  $35 - 4k$

$=$   
 $=$   $\boxed{\phantom{00}}$

**k)** If  $w = 2$ , find the value of  $8w - 5$

$=$   
 $=$   $\boxed{\phantom{00}}$

**l)** If  $u = 5$ , find the value of  $21 - 3u$

$=$   
 $=$   $\boxed{\phantom{00}}$

**m)** If  $e = 9$ , find the value of  $\frac{e + 15}{8}$

$=$   
 $=$   $\boxed{\phantom{00}}$

**n)** If  $s = 3$ , find the value of  $\frac{s + 4}{7}$

$=$   
 $=$   $\boxed{\phantom{00}}$

**o)** If  $c = 3$ , find the value of  $\frac{19 - c}{4}$

$=$   
 $=$   $\boxed{\phantom{00}}$

# 22. [Equations]

## Skill 22.1 Finding the missing number in equations involving + and - (1).

MM7 11 22 33 44  
MM8 11 22 33 44

EITHER

Use **trial and error**:

- Guess the value of the missing number that will make the equation true (both sides of the equation are equal).
- Substitute this value in the equation.
- Check if the equation is true.
- Write the guessed value as the solution of the equation.

Example:

$$4 + \boxed{?} = 12$$

$$4 + 8 = 12$$

$$12 = 12 \text{ (true)}$$

The equation is true, so **8** is the solution.

OR

Use **inverse operations**:

- Consider the operation used to construct the sum or the difference.
- Get the missing number alone on one side of the equation, by performing the inverse operation to both sides of the equation.
- Evaluate the other side of the equation.

Hints: Addition and subtraction are inverse operations. In addition, the sum is greater than the numbers. In subtraction, the difference is less than the numbers.

Example:  $4 + \boxed{?} = 12$

$$4 + ? - 4 = 12 - 4$$

$$? = 8$$

**Q.**  $15 - \boxed{\phantom{00}} = 9$       **A.**  $15 - ? = 9$       OR       $\textcircled{15} - ? = 9$

What numbers subtract from 15 gives 9?       $15 - 6 = 9$        $15 - 15 - ? = 9 - 15$       If 15 was added to the missing number, then do the inverse operation and subtract 15 from both sides of the equation. Finally, reverse the signs on both sides.

$9 = 9 \text{ (true)}$        $-? = -6$        $? = 6$

The solution is **6**.

Use trial and error

a)  $16 - \boxed{7} = 9$       b)  $7 + \boxed{\phantom{00}} = 15$       c)  $\boxed{\phantom{00}} + 24 = 30$

$16 - ? = 9$        $7 + ? = 15$        $? + 24 = 30$

.....

$? = 7$        $? =$        $? =$

.....

d)  $14 - \boxed{\phantom{00}} = 6$       e)  $13 - \boxed{\phantom{00}} = 3$       f)  $8 + \boxed{\phantom{00}} = 21$

.....

$? =$        $? =$        $? =$

.....

g)  $\boxed{\phantom{00}} + 8 = 20$       h)  $14 + \boxed{\phantom{00}} = 21$       i)  $\boxed{\phantom{00}} - 8 = 13$

.....

$? =$        $? =$        $? =$

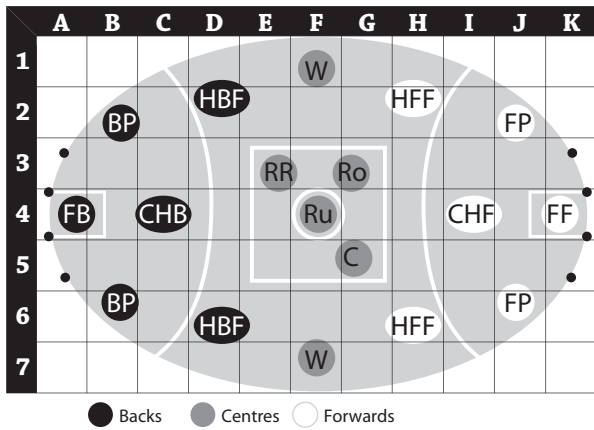
.....

**Skill 23.2** Using grid references to describe location on a map (1).

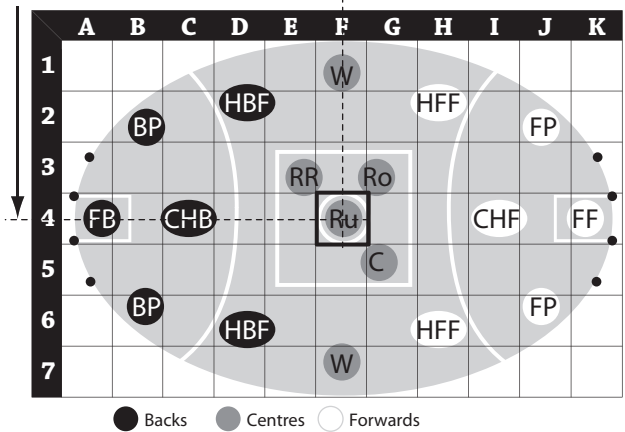
MM7 11 22 33 44  
MM8 11 22 33 44

- Locate the object on the grid.
- Starting from the left, first read across the horizontal axis to find the letter that matches the column of the object.
- Then read along the vertical axis to find the number that matches the row of the object.
- Write the letter followed by the number to specify the grid reference.

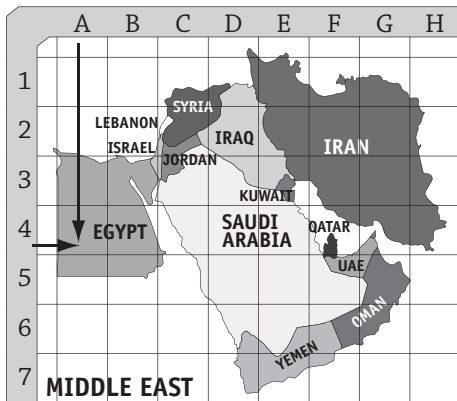
**Q.** In this AFL starting line up, what is the grid reference of the Ruck (Ru)?



**A.** The grid reference is **F4**.



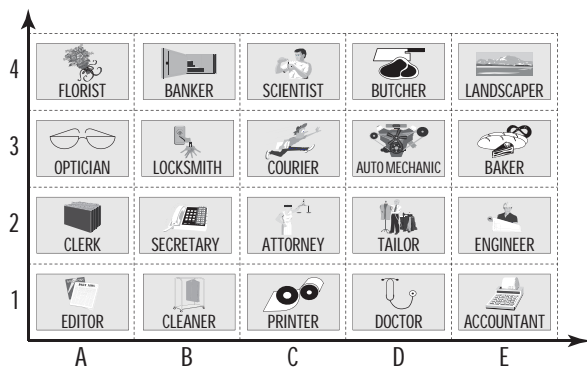
**a)** In which country would you be if you were located at A4?



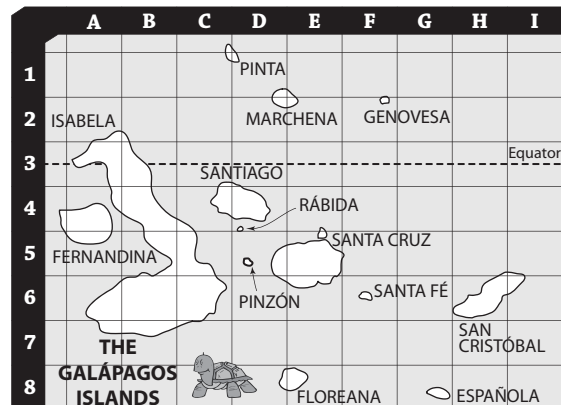

**b)** Above which continent would you be if your airplane is flying at O6?




**c)** Which occupation is listed at C4?




**d)** On which island would you be if you were located at G8?





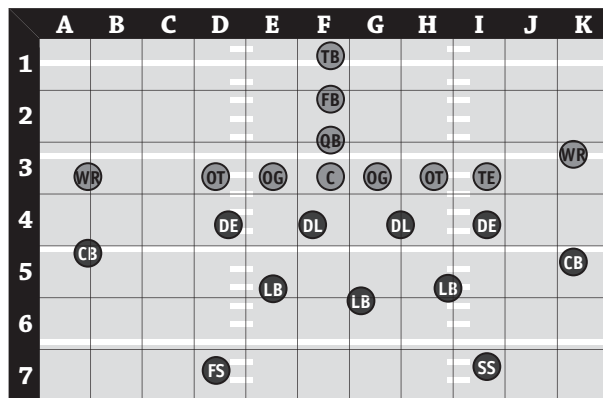
**Skill 23.2** Using grid references to describe location on a map (2).

MM7 1 | 2 2 3 3 4 4  
MM8 1 | 2 2 3 3 4 4

e) On which mountain would you be if you were located at C5?

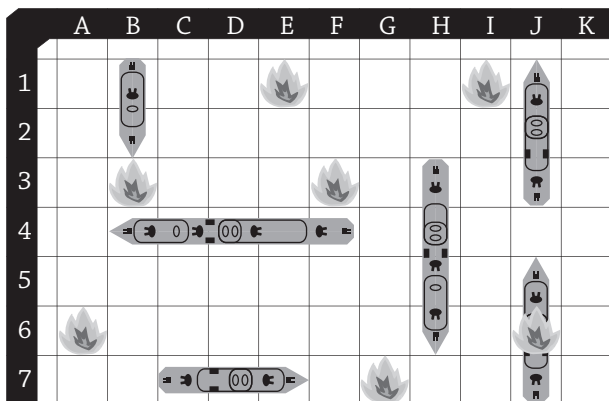



f) In this gridiron starting line up, what is the grid reference of the Tight End (TE)?



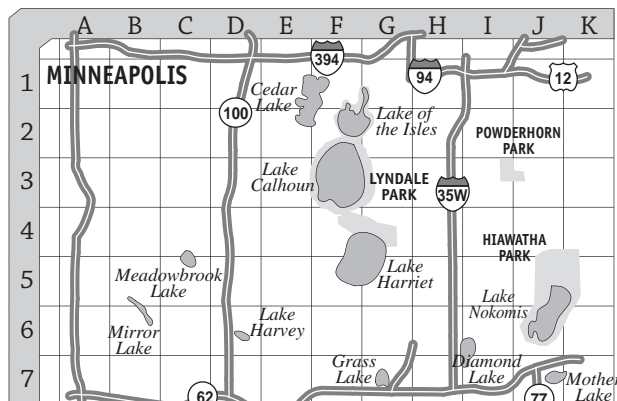
● Offense  
● Defense

g) What is the grid reference of an enemy hit on a battleship?

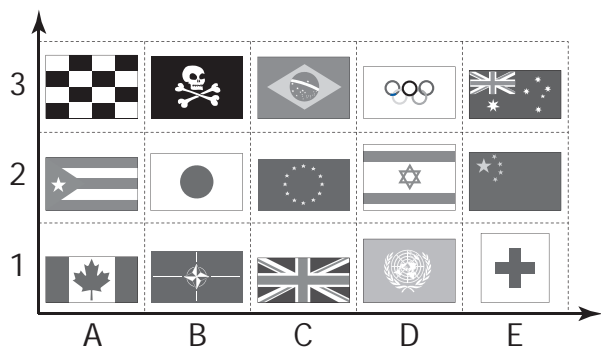


🔥 Enemy hit  
🚢 Battleship

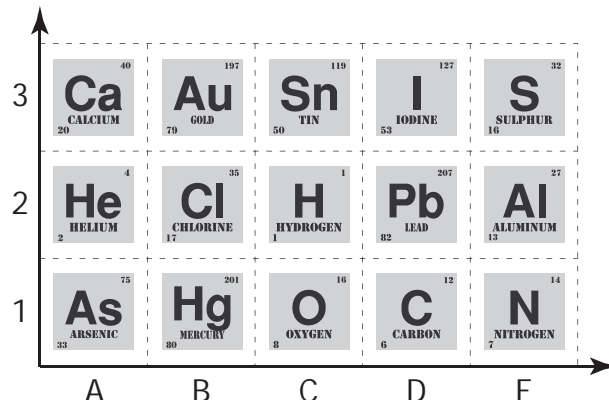
h) What is the grid reference of Grass Lake?




i) What is the grid reference of the Red Cross flag?




j) What is the grid reference of Hydrogen (H)?

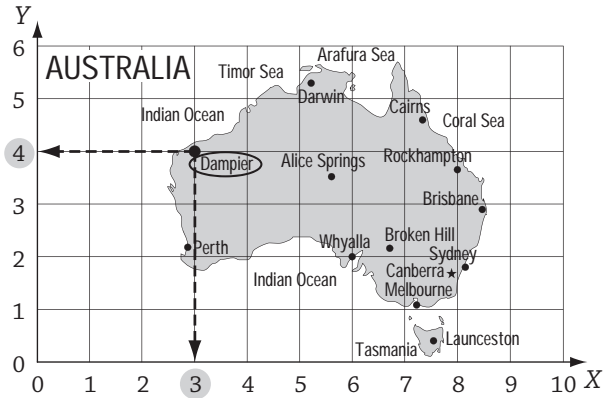


**Skill 23.3** Using coordinates to describe location on a map.

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

- Locate the object on the coordinate plane.
  - Move vertically from the object until you intersect the horizontal axis (x-axis).
  - Write the number you find on the horizontal axis as the x-coordinate of the point (x, ).
  - Move horizontally from the object until you intersect the vertical axis (y-axis).
  - Write the number you find on the vertical axis as the y-coordinate of the point ( , y).
  - Read the coordinate on the horizontal axis first, then on the vertical axis.
- Hint: x before y in the alphabet is one way to remember this order.

**Q.** What are the coordinates of Dampier?



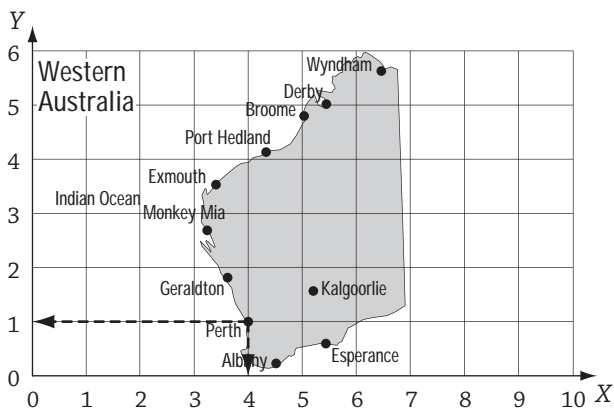
**A.** Locate Dampier on the map.

Follow the vertical line that Dampier is on, down to where it meets the horizontal axis. The x-coordinate is 3.

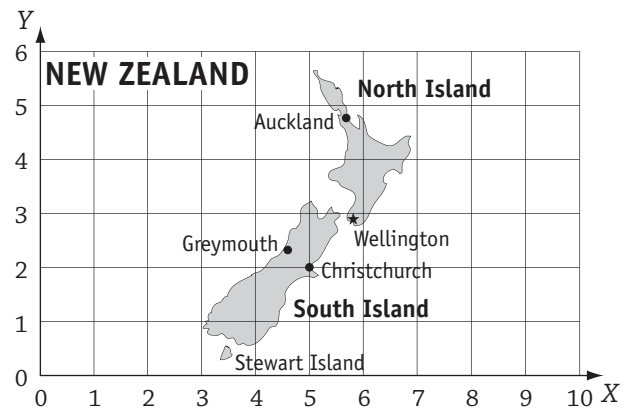
Follow the horizontal line that Dampier is on, back to where it meets the vertical axis. The y-coordinate is 4.

The coordinates that describe the location of Dampier are **(3,4)**.

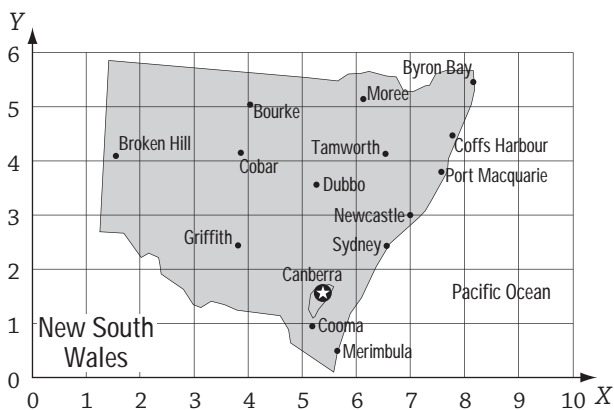
**a)** What are the coordinates of Perth?



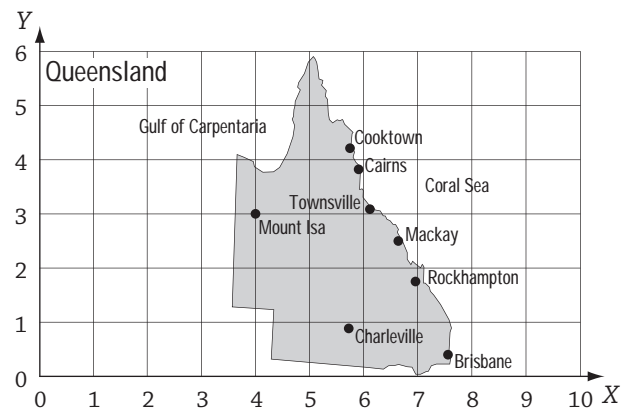

**b)** Which city is located at the coordinates (5,2)?




**c)** What are the coordinates of Newcastle?




**d)** What are the coordinates of Mount Isa?



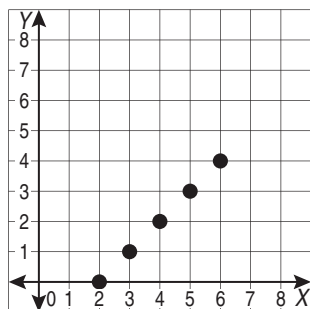
**Skill 23.5** Finding the coordinates of a point on a Cartesian plane (1).

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

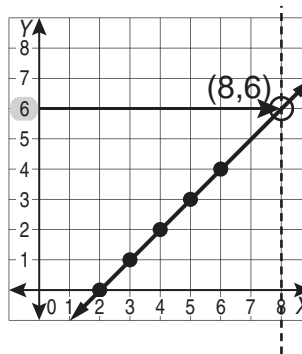
- Locate the point on the coordinate plane.
- Move vertically from the object until you intersect the horizontal axis ( $x$ -axis).
- Write the number you find on the horizontal axis as the  $x$ -coordinate of the point ( $x$ , ).
- Move horizontally from the object until you intersect the vertical axis ( $y$ -axis).
- Write the number you find on the vertical axis as the  $y$ -coordinate of the point ( ,  $y$ ).

Hints: I ways write the  $x$  oordinate first.  
he oordinates of the ori in are .

**Q.** These dots, if joined, would form a line. A point on this line has an  $x$ -coordinate of 8. What is the  $y$ -coordinate of this point?



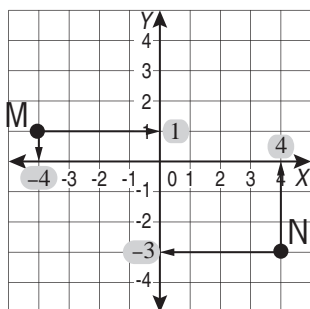
**A.**



Join the given dots. Draw a vertical line through the  $x$ -coordinate 8. Plot the point where the vertical line intersects the other line. Read the  $y$ -coordinate of this point.

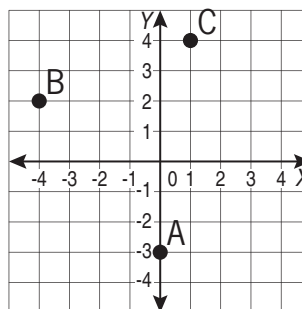
The  $y$ -coordinate is 6

**a)** What are the coordinates of the points M and N on this Cartesian plane?



M(-4, 1) N( , )

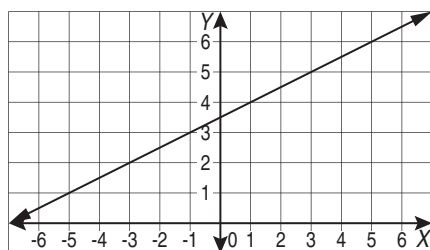
**b)** What are the coordinates of the points A, B and C on this Cartesian plane?



A( , ) B( , ) C( , )

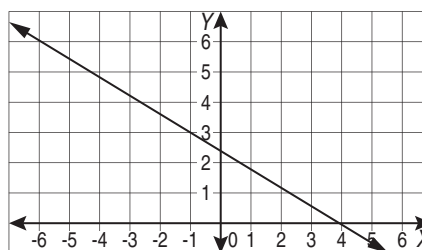
**c)** Which point lies on the line graphed below?

M(-5,1) N(0,5) P(6,6)



**d)** Which point lies on the line graphed below?

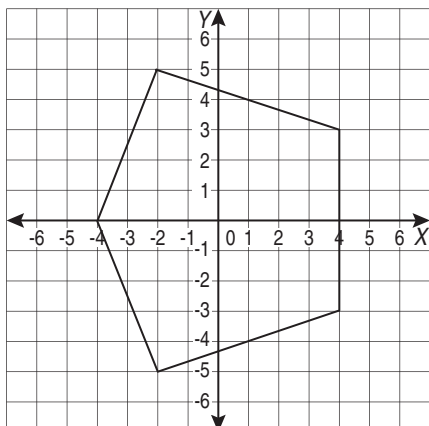
E(-4,0) F(3,3) G(-1,3)



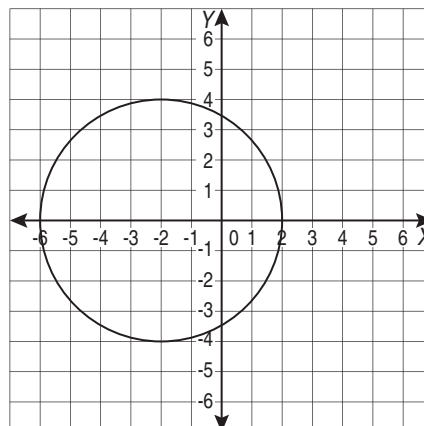
**Skill 23.5** Finding the coordinates of a point on a Cartesian plane (2).

MM7 11 22 33 44  
MM8 11 22 33 44

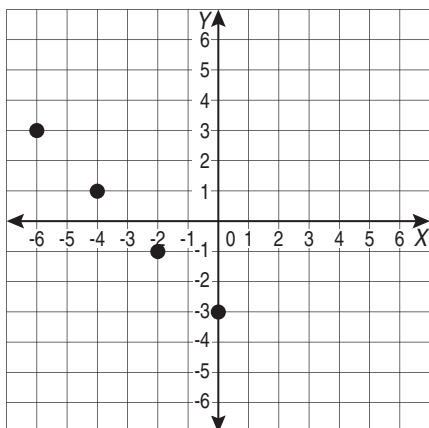
- e) Which ordered pair lies within this pentagon?  
A)  $(-6,-2)$  B)  $(-3,4)$  C)  $(3,-2)$



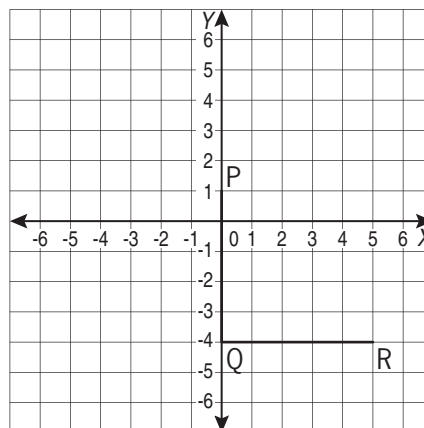

- f) Which ordered pair lies within this circle?  
A)  $(-4,5)$  B)  $(-5,-2)$  C)  $(3,-6)$



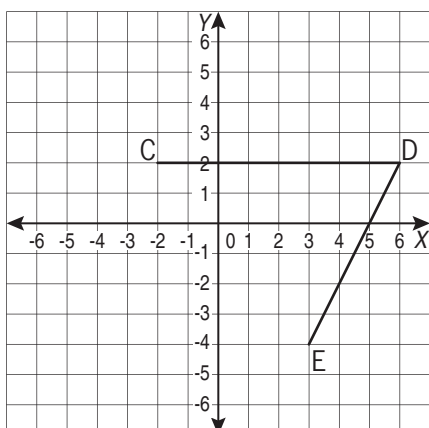

- g) These dots, if joined, would form a line. A point on this line has an  $x$ -coordinate of 3. What is the  $y$ -coordinate of this point?



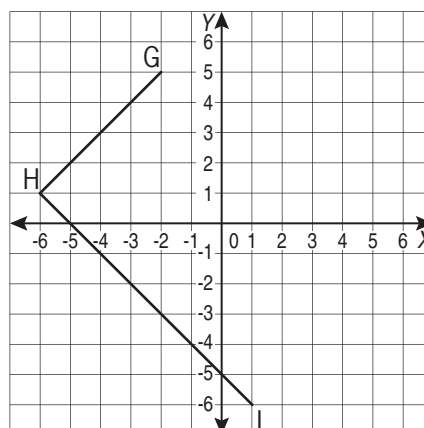

- h) What are the coordinates of point S that will make PQRS a square?




- i) What are the coordinates of point F that will make CDEF a parallelogram?




- j) What are the coordinates of point J that will make GHIJ a rectangle?



**Skill 24.2** Converting units of length (1).

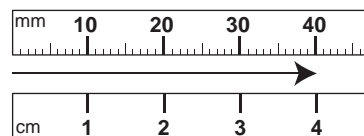
MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

**Conversion Facts - LENGTH**

$$1 \text{ km} = 1000 \text{ m} = 100\,000 \text{ cm} = 1\,000\,000 \text{ mm}$$

$$1 \text{ m} = 100 \text{ cm} = 1000 \text{ mm}$$

$$= 1 \text{ cm} = 10 \text{ mm}$$



To change from **smaller** units to **larger** units:

- Divide by the conversion factor (because you need less).

Example: To change  
mm to cm  
÷ by 10

To change from **larger** units to **smaller** units:

- Multiply by the conversion factor (because you need more).

Example: To change  
cm to mm  
× by 10

**Q.**  $3800 \text{ cm} = \boxed{\phantom{000}} \text{ m}$

**A.**  $3800 \text{ cm} = 3800 \div 100 \text{ m}$  m to m: ÷  
 $= 38 \text{ m}$

**a)**  $24 \text{ cm} = \boxed{240} \text{ mm}$   
m to mm: ×

**b)**  $120 \text{ mm} = \boxed{\phantom{00}} \text{ cm}$   
mm to m: ÷

$24 \times 10 = 240$

**c)**  $130 \text{ cm} = \boxed{\phantom{000}} \text{ mm}$

**d)**  $8 \text{ km} = \boxed{\phantom{000}} \text{ m}$

**e)**  $7000 \text{ m} = \boxed{\phantom{000}} \text{ km}$

**f)**  $6 \text{ m} = \boxed{\phantom{000}} \text{ cm}$

**g)**  $19 \text{ m} = \boxed{\phantom{000}} \text{ mm}$

**h)**  $50 \text{ mm} = \boxed{\phantom{000}} \text{ cm}$

**i)**  $12 \text{ km} = \boxed{\phantom{000}} \text{ m}$

**j)**  $11\,000 \text{ m} = \boxed{\phantom{000}} \text{ km}$

**Skill 24.2** Converting units of length (2).

MM7 1 1 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

k) 15 m =  mm

.....

l) 16 m =  cm

.....

m) 7000 m =  km

.....

n) 4000 cm =  m

.....

o) 140 m =  cm

.....

p) 19 cm =  mm

.....

q) 270 cm =  m

.....

r) 30 m =  cm

.....

s) 500 mm =  m

.....

t) 4.1 km =  m

.....

u) 2.8 m =  mm

.....

v) 600 m =  km

.....

w) 0.2 km =  m

.....

x) 3.7 m =  mm

.....

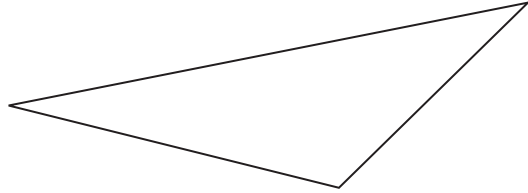
# 25. [Perimeter]

**Skill 25.1** Finding the perimeter of polygons by measuring their side lengths.

MM7 11 22 33 44  
MM8 11 22 33 44

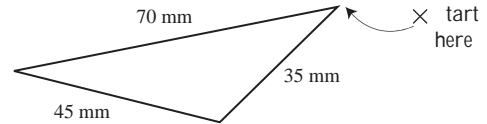
- Measure each side length of the shape.
- Add together the side lengths.

**Q.** Use a ruler to find the perimeter of the scalene triangle in millimetres.

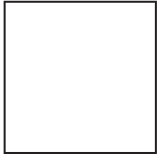


**A.**  $35\text{ mm} + 45\text{ mm} + 70\text{ mm}$   
= **150 mm**

Measure the side lengths.  
Write down the lengths next to each side.

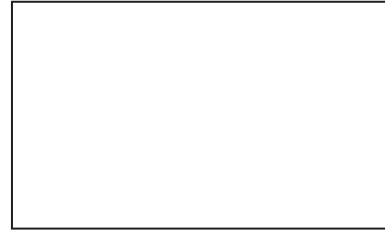


**a)** Use a ruler to find the perimeter of the square in centimetres.



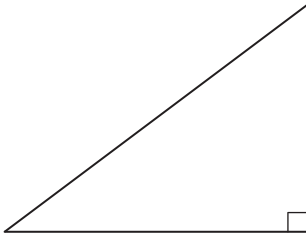
$4 \times 2$  =

**b)** Use a ruler to find the perimeter of the rectangle in millimetres



..... =

**c)** Use a ruler to find the perimeter of the right-angled triangle in centimetres.



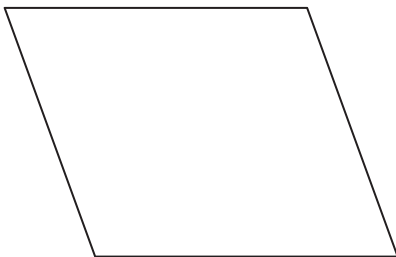
..... =

**d)** Use a ruler to find the perimeter of the trapezium in centimetres.



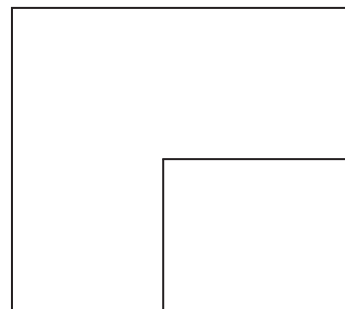
..... =

**e)** Use a ruler to find the perimeter of the parallelogram in millimetres.



..... =

**f)** Use a ruler to find the perimeter of the polygon in millimetres.

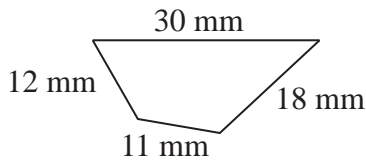


..... =

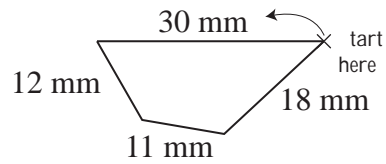
**Skill 25.2** Calculating the perimeter of polygons when all side lengths are given (1).

- Add together the side lengths.

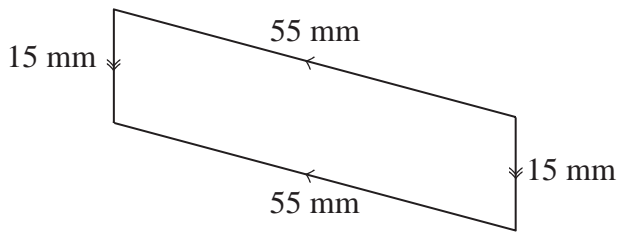
**Q.** Calculate the perimeter of the quadrilateral.



**A.**  $30\text{ mm} + 12\text{ mm} + 11\text{ mm} + 18\text{ mm}$   
 $= 71\text{ mm}$

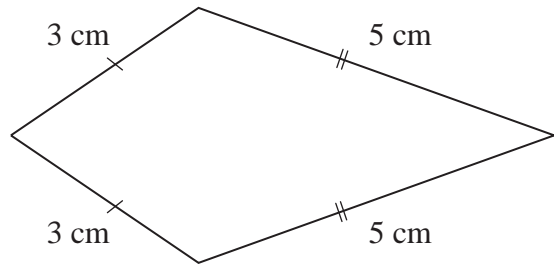


**a)** Calculate the perimeter of the parallelogram.



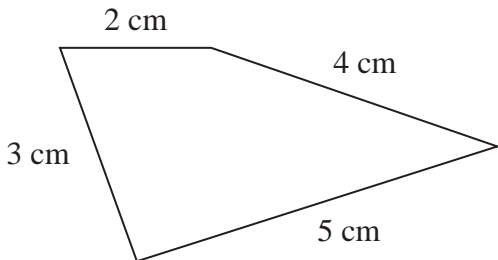
$15 + 15 + 55 + 55 = 140\text{ mm}$

**b)** Calculate the perimeter of the kite.



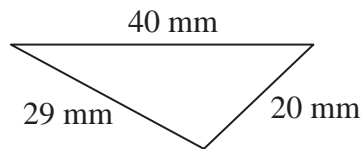
..... =

**c)** Calculate the perimeter of the quadrilateral.



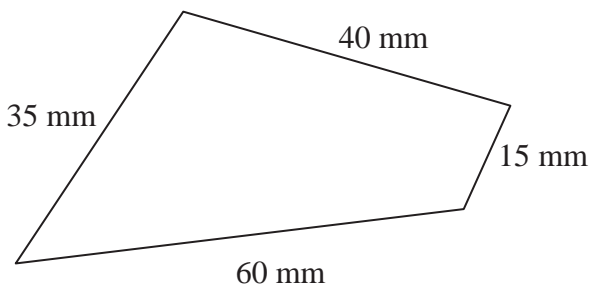
..... =

**d)** Calculate the perimeter of the scalene triangle.



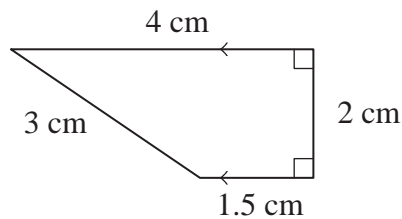
..... =

**e)** Calculate the perimeter of the quadrilateral.



..... =

**f)** Calculate the perimeter of the trapezium.



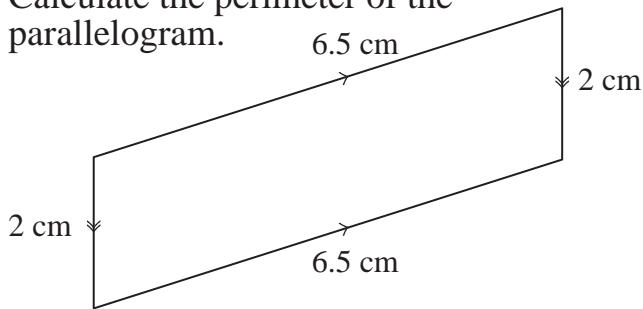
..... =



**Skill 25.2** Calculating the perimeter of polygons when all side lengths are given (2).

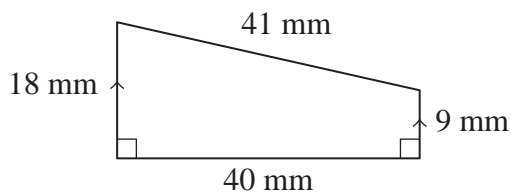
MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

**g)** Calculate the perimeter of the parallelogram.



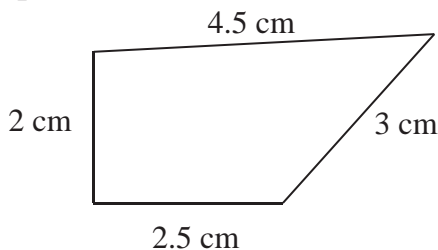
$6.5 + 2 + 6.5 + 2 = \boxed{\text{cm}}$

**h)** Calculate the perimeter of the trapezium.



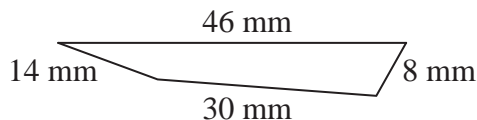
$\dots\dots\dots = \boxed{\text{mm}}$

**i)** Calculate the perimeter of the quadrilateral.



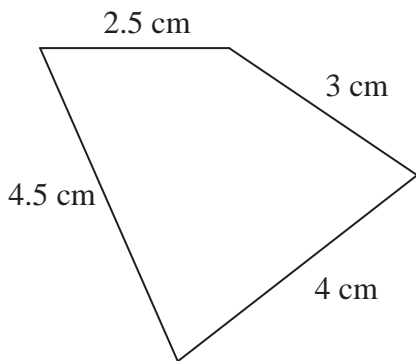
$\dots\dots\dots = \boxed{\text{cm}}$

**j)** Calculate the perimeter of the quadrilateral.



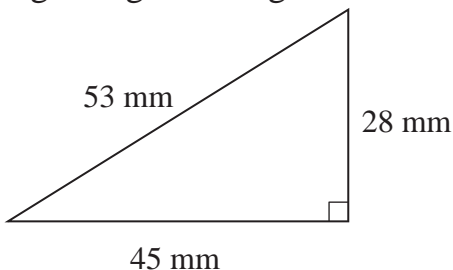
$\dots\dots\dots = \boxed{\text{mm}}$

**k)** Calculate the perimeter of the quadrilateral.



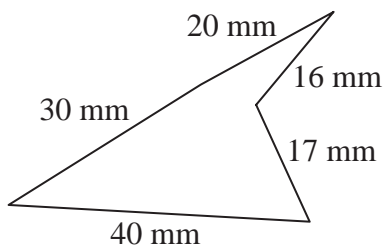
$\dots\dots\dots = \boxed{\text{cm}}$

**l)** Calculate the perimeter of the right-angled triangle.



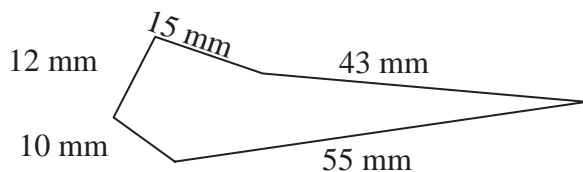
$\dots\dots\dots = \boxed{\text{mm}}$

**m)** Calculate the perimeter of the polygon.



$\dots\dots\dots = \boxed{\text{mm}}$

**n)** Calculate the perimeter of the polygon.



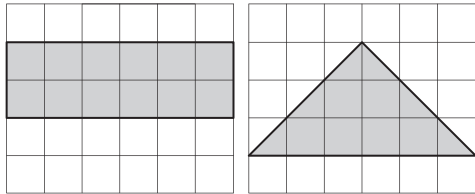
$\dots\dots\dots = \boxed{\text{mm}}$

**Skill 26.2** Comparing the area of polygons on a square grid (1).

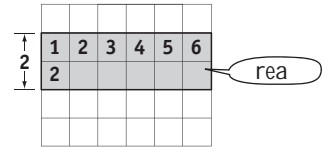
MM7 1 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

- Break the shape up into rectangles and triangles if necessary.
- Calculate the area of any rectangle by:  
Counting the squares  
OR  
Multiplying the number of squares in a row by the number of squares in a column.
- Calculate the area of any triangle by halving the area of the rectangle that would enclose it.
- Compare your results.

**Q.** Do the rectangle and the triangle have the same area?



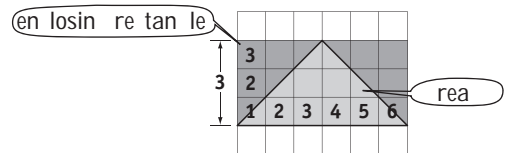
**A.**  $Area A \neq Area B$   $Area A = 6 \times 2 = 12$  sq. units  
 $\Rightarrow$  **No**



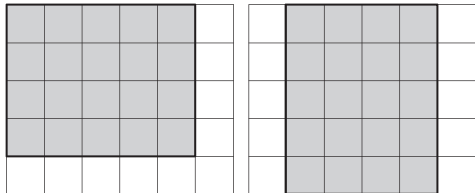
$$Area B = \frac{1}{2} \times 6 \times 3$$

$$= \frac{1}{2} \times 18$$

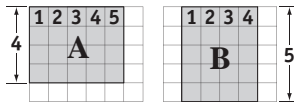
$$= 9 \text{ sq. units}$$



**a)** Do these rectangles have the same area?



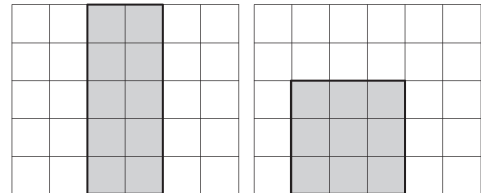
$Area A = 5 \times 4 = 20$



$Area B = 4 \times 5 = 20$

$\Rightarrow$  **yes**

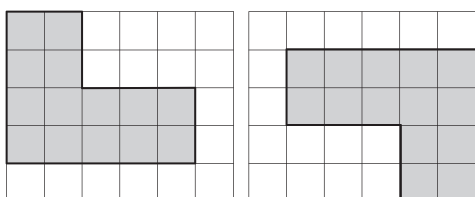
**b)** Do these rectangles have the same area?



$Area A =$

$Area B =$

**c)** Do these polygons have the same area?

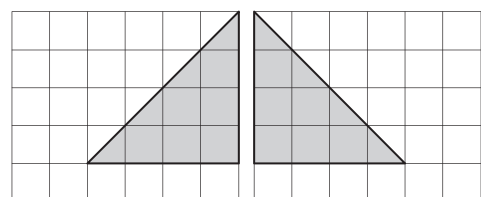


$Area A =$

$Area B =$

$\Rightarrow$

**d)** Do these triangles have the same area?



$Area A =$

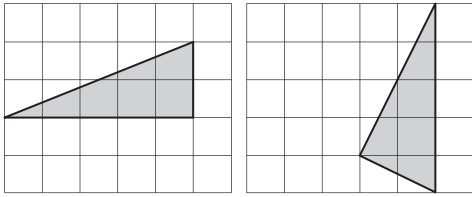
$Area B =$

$\Rightarrow$

**Skill 26.2** Comparing the area of polygons on a square grid (2).

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

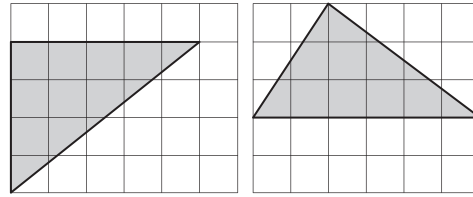
**e)** Do these triangles have the same area?



Area A = .....

Area B = ..... ⇒

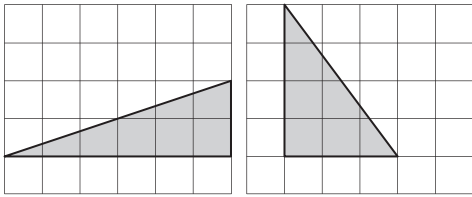
**f)** Do these triangles have the same area?



Area A = .....

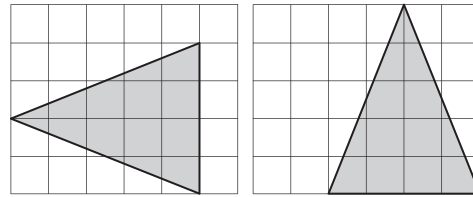
Area B = ..... ⇒

**g)** Do these triangles have the same area?



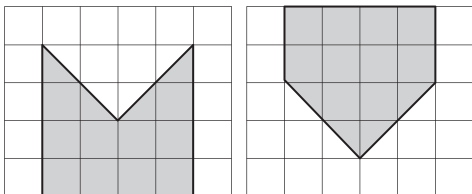
.....  
..... ⇒

**h)** Do these triangles have the same area?



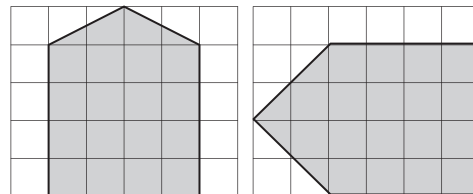
.....  
..... ⇒

**i)** Do these polygons have the same area?



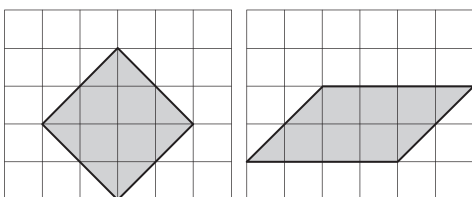
.....  
.....

**j)** Do these polygons have the same area?



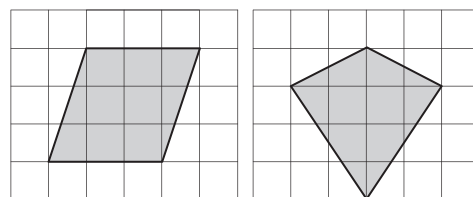
.....  
.....

**k)** Do the square and the parallelogram have the same area?



.....  
.....

**l)** Do the parallelogram and the kite have the same area?



.....  
.....

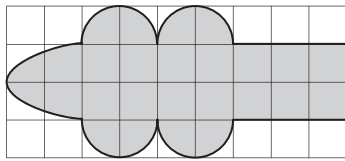
**Skill 26.3** Estimating the area of irregular shapes on a square grid.

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

- Break the shape up into workable parts (rectangles/triangles/curved shapes).
- Calculate the area of any rectangle by:  
Counting the squares  
OR  
Multiplying the number of squares in a row by the number of squares in a column.
- Calculate the area of any triangle by halving the area of the rectangle that would enclose it.
- Estimate the area of any partly curved shape by making up whole squares from the shaded region.
- Add the results.

**Q.** Find the area of the shaded shape.

[Round to the nearest whole number.]

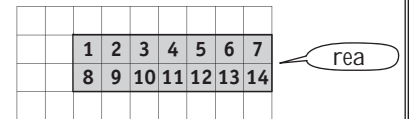


**A.** Area A + Area B

$$= 14 + 9$$

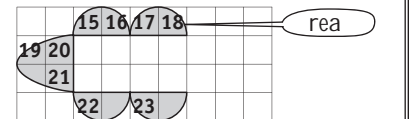
$$= 23 \text{ sq. units}$$

Area A = 14 whole units



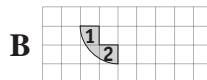
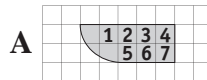
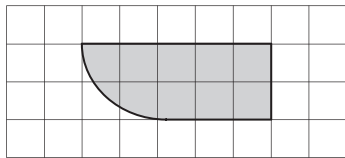
Area B = 9 units

(made up from 12 part units)



**a)** Find the area of the shaded shape.

[Round to the nearest whole number.]

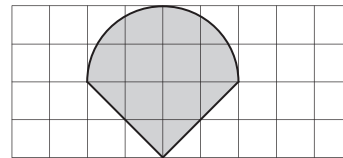


Area A = 7 and Area B = 2

Area A + B = 7 + 2 = sq. units

**b)** Find the area of the shaded shape.

[Round to the nearest whole number.]

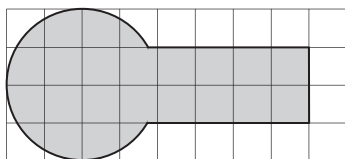


Area A =            and Area B =

Area A + B =            = sq. units

**c)** Find the area of the shaded shape.

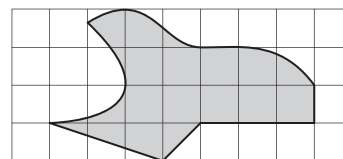
[Round to the nearest whole number.]



.....  
..... = sq. units

**d)** Find the area of the shaded shape.

[Round to the nearest whole number.]



.....  
..... = sq. units

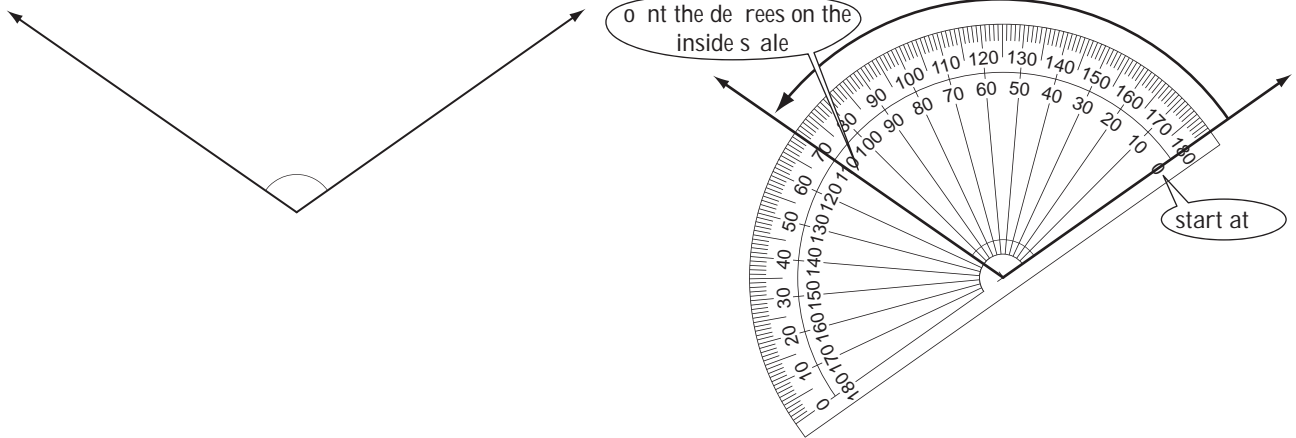
# 27. [Shapes]

## Skill 27.1 Measuring angles using a protractor (1).

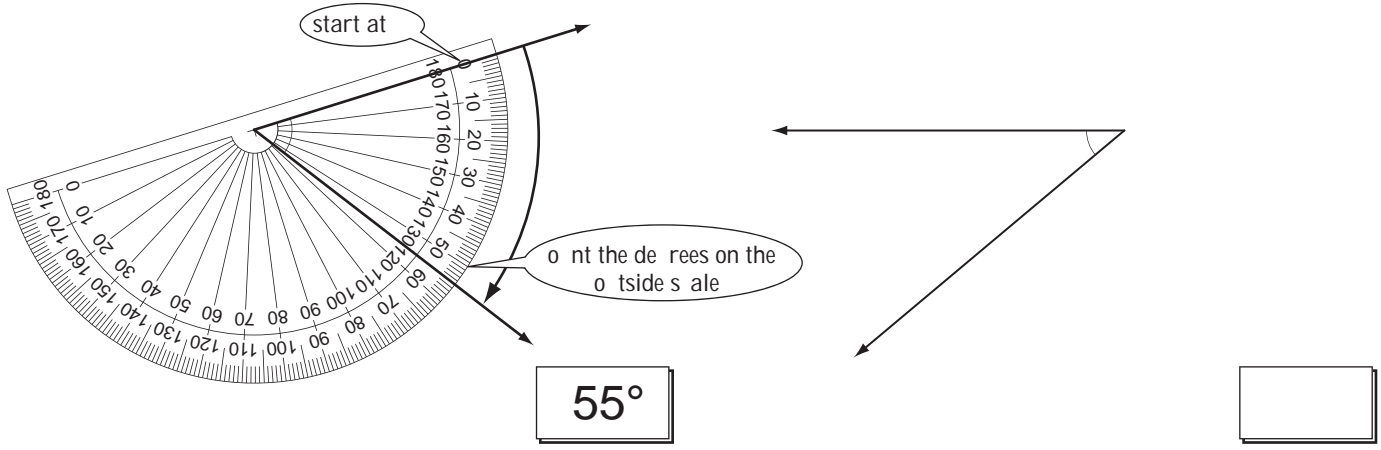
MM7 1 2 2 3 3 4 4  
MM8 1 2 2 3 3 4 4

- Place the centre of the protractor at the vertex (corner) of the angle.
- Align one of the lines forming the angle to pass through 0° on either the inside or outside scale.
- Read the measurement where the other line of the angle crosses the scale on the protractor.

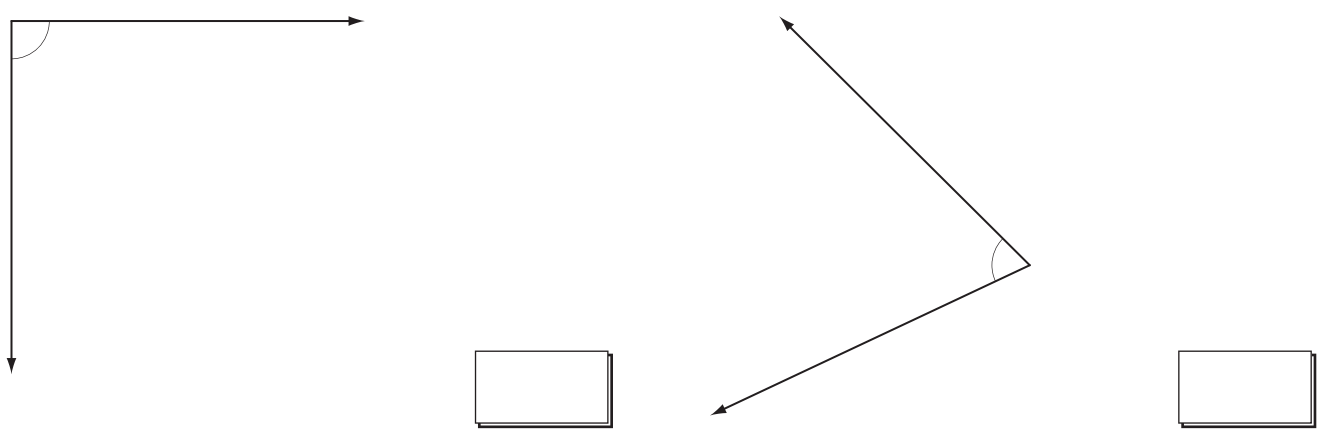
**Q.** Use a protractor to measure this angle. **A.**  $110^\circ$



**a)** Use a protractor to measure this angle. **b)** Use a protractor to measure this angle.



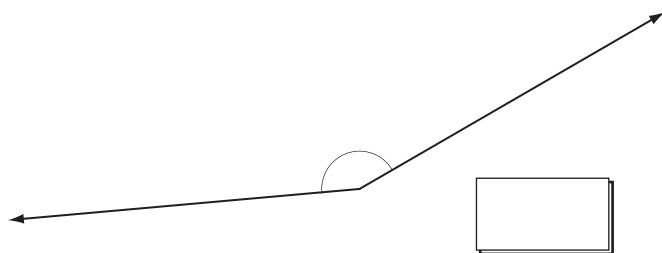
**c)** Use a protractor to measure this angle. **d)** Use a protractor to measure this angle.



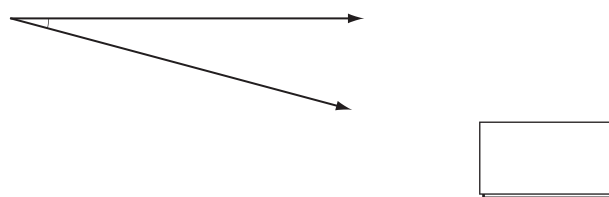
**Skill 27.1** Measuring angles using a protractor (2).

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

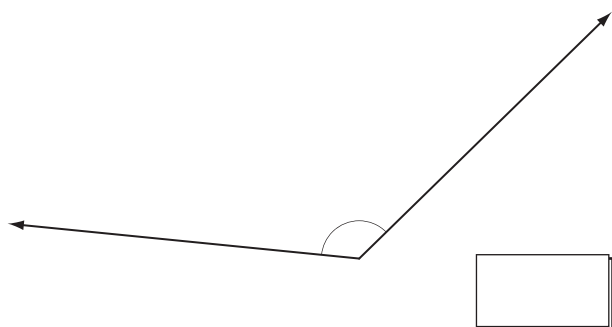
**e)** Use a protractor to measure this angle.



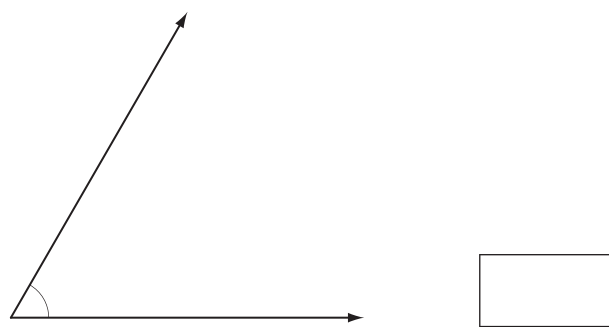
**f)** Use a protractor to measure this angle.



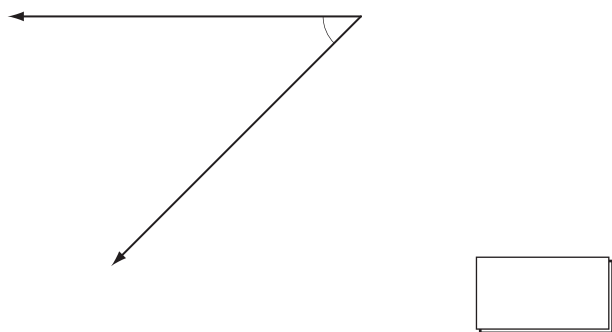
**g)** Use a protractor to measure this angle.



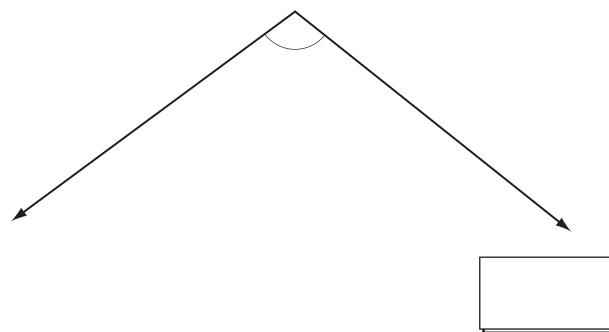
**h)** Use a protractor to measure this angle.



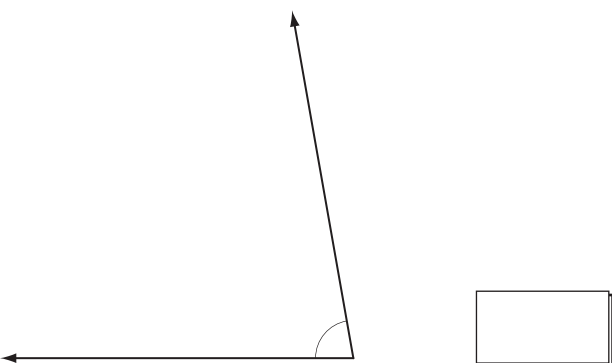
**i)** Use a protractor to measure this angle.



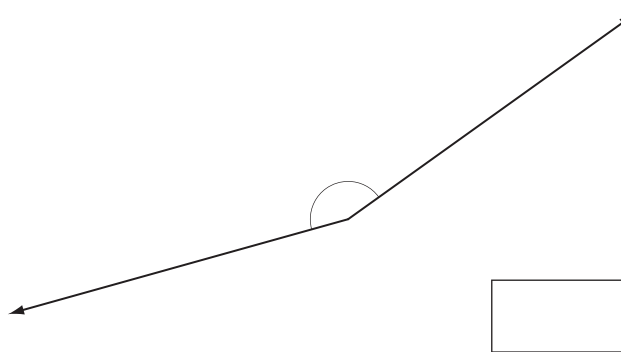
**j)** Use a protractor to measure this angle.



**k)** Use a protractor to measure this angle.



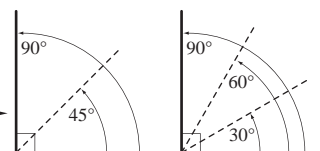
**l)** Use a protractor to measure this angle.



**Skill 27.2** Estimating the size of angles (1).

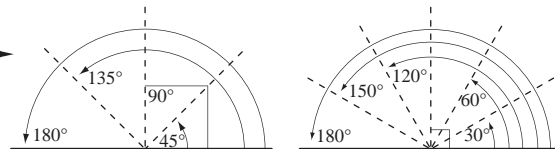
**To estimate the size of an acute angle**

- Draw a right angle ( $90^\circ$ ) overlapping one line of the given angle.
- Divide the right angle into smaller divisions, e.g. halves or thirds.

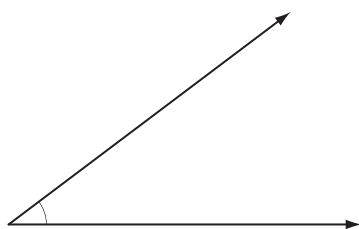


**To estimate the size of an obtuse angle**

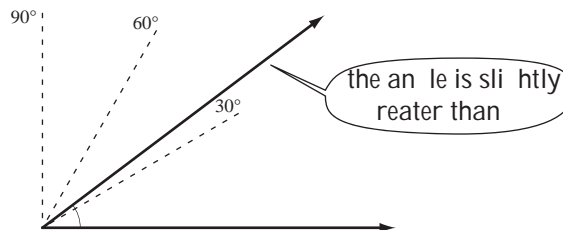
- Draw a straight angle ( $180^\circ$ ) overlapping one line of the given angle.
- Divide the straight angle into smaller divisions, e.g. quarters or sixths.



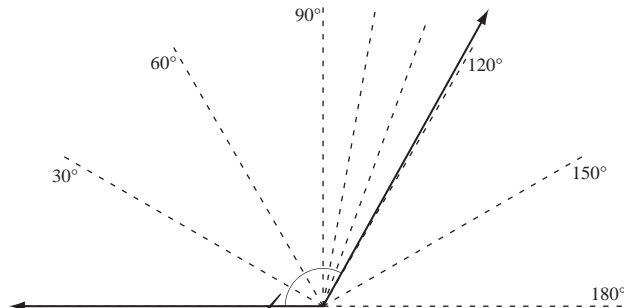
**Q.** Without measuring, would you estimate that the size of this angle is closer to  $35^\circ$  or to  $50^\circ$ ?



**A.**  $35^\circ$



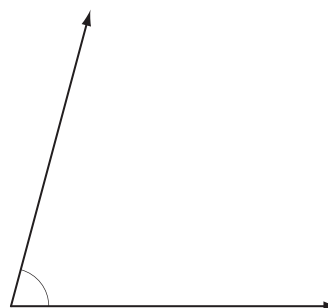
**a)** Without measuring, would you estimate that the size of this angle is closer to  $110^\circ$  or to  $120^\circ$ ?



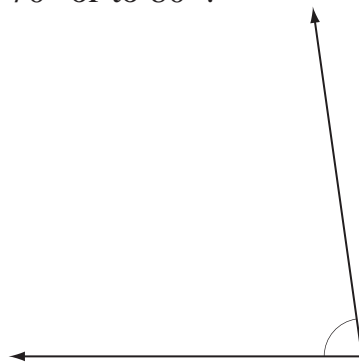
the angle is slightly smaller than

**120°**

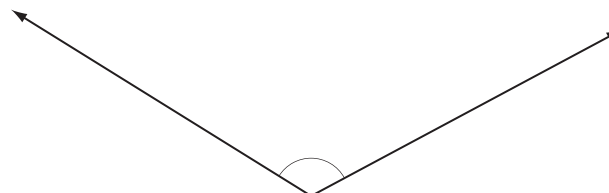
**b)** Without measuring, would you estimate that the size of this angle is closer to  $75^\circ$  or to  $90^\circ$ ?



**c)** Without measuring, would you estimate that the size of this angle is closer to  $70^\circ$  or to  $80^\circ$ ?



**d)** Without measuring, would you estimate that the size of this angle is closer to  $125^\circ$  or to  $140^\circ$ ?



**Skill 28.2** Identifying and classifying symmetry in two-dimensional shapes. MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

- Imagine a line along which the shape can be folded to have one part fit exactly over the other part.

**Q.** Draw the axes of symmetry for these shapes. Circle the shapes that are both horizontally and vertically symmetrical.



**A.**

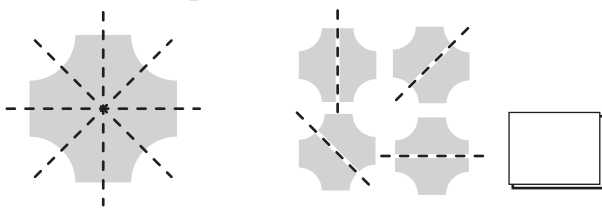
vertical  
horizontal  
✓

oblique

vertical

vertical  
horizontal  
✓

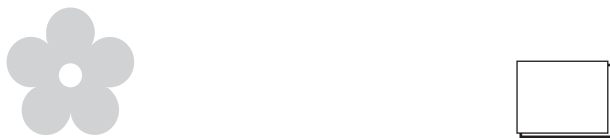
**a)** Draw all the axes of symmetry for this shape. How many axes of symmetry does this shape have?



**b)** Draw all the axes of symmetry for this shape. How many axes of symmetry does this shape have?



**c)** Draw all the axes of symmetry for this shape. How many axes of symmetry does this shape have?



**d)** Draw all the axes of symmetry for this shape. How many axes of symmetry does this shape have?



**e)** Draw the axes of symmetry for these shapes. Circle the shapes that have horizontal symmetry.



**f)** Draw the axes of symmetry for these shapes. Circle the shapes that are both horizontally and vertically symmetrical.



**g)** Draw the axes of symmetry for these shapes. Circle the shapes that have vertical symmetry.



**h)** Draw the axes of symmetry for these shapes. Circle the shapes that are both horizontally and vertically symmetrical.





**Skill 29.3** Interpreting tables.

MM7 1 1 2 2 3 3 4 4  
MM8 1 1 2 2 3 3 4 4

- Read the title and sub-headings.
- Check what each row (across) and column (down) represents.
- To find the information you need, follow a row across to where it meets the relevant column.
- Using the information gathered, perform any calculations necessary.

**Q.** Which type of nut contains twice as much protein as a walnut?

Nut (100 g)	energy (kj)	proteins (g)	fats (g)	carbohydrates (g)
cashew	2314	18.2	43.9	28.72
peanut	2385	25	47	16.5
almond	2418	19.8	50	19
pistachio	2391	21.4	46	27.7
walnut	2578	9.9	59	8.6

**A.** *almond*

Walnut protein is 9.9 g

$$9.9 \times 2 = 19.8$$

Almond protein is 19.8 g

↓

Nut (100 g)	energy (kj)	proteins (g)	fats (g)	carbohydrates (g)
cashew	2314	18.2	43.9	28.72
peanut	2385	25	47	16.5
almond	2418	19.8	50	19
pistachio	2391	21.4	46	27.7
walnut	2578	9.9	59	8.6

←

**a)** Of the birds listed, which bird has a wingspan of 3.4 metres?

Win S ans							
arn owl	wed e tailed ea le	oo a urra	swan	white eli an	ondor	stor	al atross

**b)** Which type of coal has the highest percentage of carbon?

Coal Type	moisture	carbon	other
lignite	35%	30%	35%
sub-bituminous coal	10%	75%	15%
bituminous coal	5%	80%	15%
anthracite	3%	92%	5%

**c)** Which activity expends one third of the amount of kj per minute as swimming?

ner needed er inute					
slee in	writin	house wor	tennis dou les	swi in	lin s rintin

**d)** How many chemicals in seawater have a content of more than one part per thousand?

Principal constituents of seawater	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>2</sub> )	Sulphate (SO <sub>4</sub> )	Chloride (Cl)	Bromide (Br)	Total dissolved solids (Salinity)
	Chemical Constituent								
Content (parts per thousand)	0.419	1.304	10.710	0.390	0.145	2.690	19.350	0.070	19.350

**e)** Which ski field listed below has the second most number of lifts?

Australian snow field	Skiable area (hectares)	Number of Lifts
Perisha Blue	1245	49
Thredbo	480	14
Seiwyn	45	12
Charlotte Pass	50	4
Mt Buller	180	25
Mt Hotham	245	13
Falls Creek	451	14
Mt Baw Baw	30	7

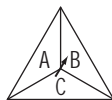
**f)** Which animal has the greatest  $\frac{\text{jump height}}{\text{weight}}$  ratio?

How high can they jump?	Antelope	Human	Cat	Galago	Cuban tree frog	Locust	Flea
Animal							
Weight (g)	200 000	70 000	2500	300	12.9	3	0.0005
Jump height (cm)	250	60	150	225	65	45	10

**Skill 30.3** Finding the possible outcomes (sample spaces) of an event by completing tables.

- Complete the table to reveal all the possible outcomes (PO) (sample space).
- Count the number of possible outcomes (PO) (sample space).

**Q.** How many different outcomes are possible when a die is thrown and this spinner is spun? [Complete the table.]



		Die					
		1	2	3	4	5	6
Spinner	A	A,1	A,2				
	B	B,1					
	C	C,1					

**A.**  $PO = 18$

Possible outcomes		Die					
		1	2	3	4	5	6
Spinner	A	A,1	A,2	A,3	A,4	A,5	A,6
	B	B,1	B,2	B,3	B,4	B,5	B,6
	C	C,1	C,2	C,3	C,4	C,5	C,6

a h spa e represents o t ome

**a)** A zoo has both male and female primates. There are gorillas and chimpanzees. Find the size of the sample space. [Complete the table.]

Outcomes (sample space)		
male	gorilla	1
male	chimpanzee	2
female	gorilla	3
female	chimpanzee	4

a h row represents o t ome

**b)** How many different outcomes are possible choosing a primary colour (red, blue and green) and tossing a coin? [Complete the table.]

Possible outcomes		Primary colour		
		R	G	B
Coin	H	R,H		
	T			

**c)** How many different outcomes are possible when rolling a die and flipping a coin? [Complete the table.]

Possible outcomes		Die					
		1	2	3	4	5	6
Coin	H	H,1	H,2				
	T	T,1					

**d)** How many different outcomes are possible when spinning a spinner labelled 1, 2, 3, 4, 5 and flipping a coin? [Complete the table.]

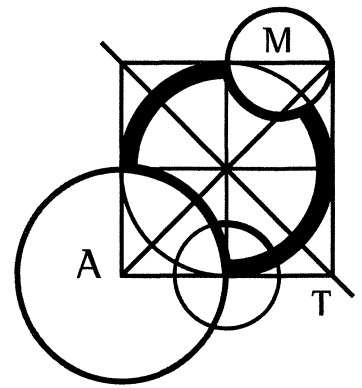
Possible outcomes		Spinner				
		1	2	3	4	5
Coin	H	1,H				
	T					

**e)** A car comes in silver, red or purple as a convertible or hardtop. Find the size of the sample space. [Complete the table.]

Outcomes (sample space)	
silver	convertible
silver	
red	

**f)** A vendor sells vanilla and chocolate ice cream. Customers can have a waffle or sugar cone and either hot fudge or caramel topping. How many different outcomes are possible when ordering an ice cream in a cone with a single topping? [Complete the table.]

Outcomes (sample space)		
vanilla	waffle	hot fudge
vanilla		caramel
vanilla		



WEDNESDAY 25 JULY 2007

## JUNIOR DIVISION COMPETITION PAPER

AUSTRALIAN SCHOOL YEARS 7 AND 8  
TIME ALLOWED: 75 MINUTES

### INSTRUCTIONS AND INFORMATION

#### GENERAL

1. Do not open the booklet until told to do so by your teacher.
2. NO calculators, slide rules, log tables, maths stencils, mobile phones or other calculating aids are permitted. Scribbling paper, graph paper, ruler and compasses are permitted, but are not essential.
3. Diagrams are NOT drawn to scale. They are intended only as aids.
4. There are 25 multiple-choice questions, each with 5 possible answers given and 5 questions that require a whole number between 0 and 999. The questions generally get harder as you work through the paper. There is no penalty for an incorrect response.
5. This is a competition not a test; do not expect to answer all questions. You are only competing against your own year in your own State or Region so different years doing the same paper are not compared.
6. Read the instructions on the **Answer Sheet** carefully. Ensure your name, school name and school year are filled in. It is your responsibility that the Answer Sheet is correctly coded.
7. When your teacher gives the signal, begin working on the problems.

#### THE ANSWER SHEET

1. Use only lead pencil.
2. Record your answers on the reverse of the Answer Sheet (not on the question paper) by FULLY colouring the circle matching your answer.
3. Your Answer Sheet will be read by a machine. The machine will see all markings even if they are in the wrong places, so please be careful not to doodle or write anything extra on the Answer Sheet. If you want to change an answer or remove any marks, use a plastic eraser and be sure to remove all marks and smudges.

#### INTEGRITY OF THE COMPETITION

The AMC reserves the right to re-examine students before deciding whether to grant official status to their score.

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## Junior Division

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### Questions 1 to 10, 3 marks each

1. The value of  $37 - 16$  is

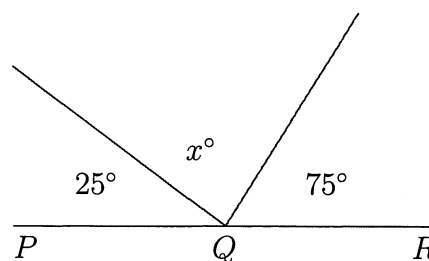
- (A) 1                      (B) 9                      (C) 11                      (D) 21                      (E) -21
- 

2. The value of  $\frac{6 \times 7}{3}$  is

- (A) 7                      (B) 14                      (C) 21                      (D) 1                      (E) 39
- 

3. In the diagram, where  $PQR$  is a straight line,  $x$  equals

- (A) 60   (B) 70   (C) 80   (D) 90   (E) 100



4. My mother left her car in the car park at 11 am and returned 5 hours later. The time when she returned was

- (A) 6 pm                      (B) 5 pm                      (C) 4 pm                      (D) 3 pm                      (E) 2 pm
- 

5. The sum of the smallest and largest of the five numbers 3.1, 0.6, 3, 6 and 0.5 is

- (A) 6                      (B) 9                      (C) 6.1                      (D) 6.6                      (E) 6.5
- 

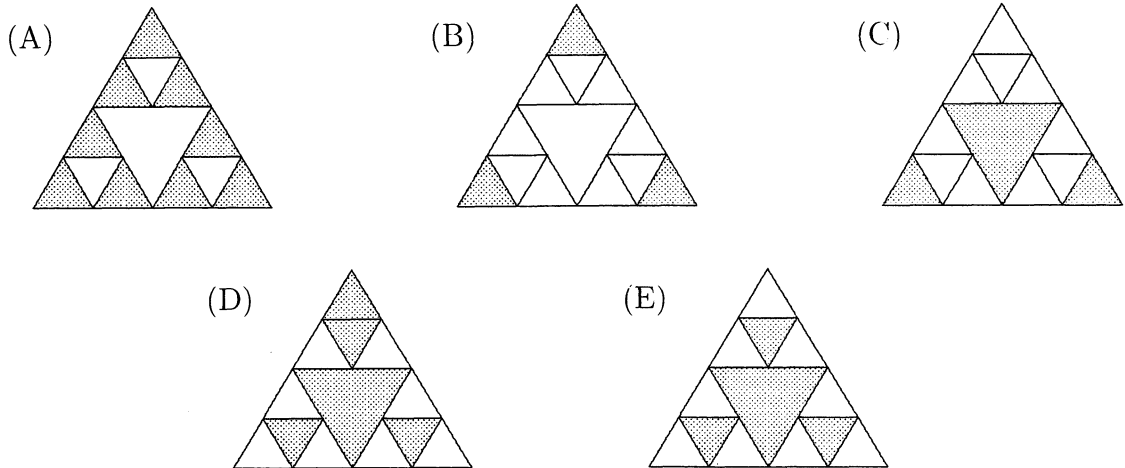
6. Tony wanted to add 97 to 298 and first added 100 to 300. What must he now subtract from this result to obtain  $97 + 298$ ?

- (A) 2                      (B) 3                      (C) 5                      (D) 6                      (E) 15
- 

7. A tray of mangoes costs \$46. Each tray has 5 rows with 6 in each row. The cost of three mangoes is

- (A) \$4                      (B) \$4.20                      (C) \$4.30                      (D) \$4.60                      (E) \$5
-

8. Which of the following shows three-eighths of the figure shaded?



9. If  $97 + a = 100 + b$ , then

- (A)  $a = b + 3$     (B)  $a = b - 3$     (C)  $a = 3b$     (D)  $b = 3a$     (E)  $a + 3 = b - 3$

10. Of the following, which is the largest fraction?

- (A)  $\frac{7}{15}$     (B)  $\frac{3}{7}$     (C)  $\frac{6}{11}$     (D)  $\frac{4}{9}$     (E)  $\frac{1}{2}$

**Questions 11 to 20, 4 marks each**

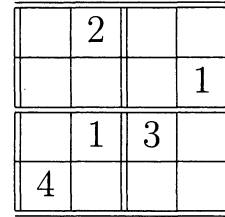
11. Two cats together catch 60 mice. If Tiger catches three mice for every two Shorty catches, how many mice does Shorty catch?

- (A) 20    (B) 24    (C) 30    (D) 36    (E) 40

12. A class of 30 students has a spelling quiz every day. On Monday, 17 of the students scored 100% on the quiz. On Tuesday, 18 students scored 100% on the quiz. The least possible number of students who scored 100% on both quizzes is

- (A) 1    (B) 5    (C) 13    (D) 15    (E) 17

13. The game of *Four Tofu* is played on a  $4 \times 4$  grid. When completed, each of the numbers 1, 2, 3 and 4 occurs in each row and column of the  $4 \times 4$  grid and also in each  $2 \times 2$  corner of the grid.



When the grid shown is completed, the sum of the four numbers in the corners of the  $4 \times 4$  grid is

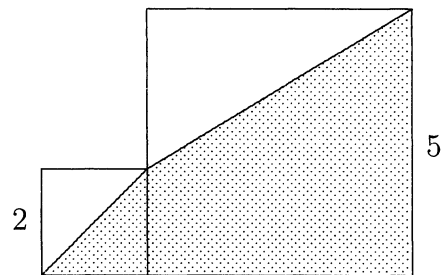
- (A) 13                      (B) 11                      (C) 15                      (D) 12                      (E) 10

14. How many numbers in the range 100 to 1000 are divisible by 6?

- (A) 136                      (B) 150                      (C) 160                      (D) 165                      (E) 166

15. A square with side length 2 units is placed next to a square with side length 5 units as shown. The shaded area, in square units, is

- (A) 13.5                      (B) 14.5                      (C) 18.5  
(D) 19.5                      (E) 26

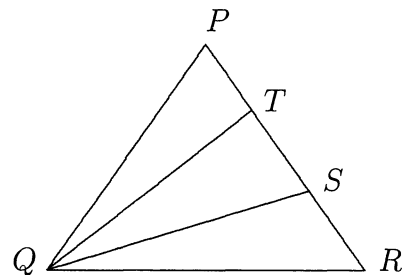


16. Ace, Bea, Cec, Dee, Eve, Fie and Geo are 1, 2, 3, 4, 5, 6 and 7 years old, in some order. Dee is three times as old as Bea. Cec is four years older than Eve. Fie is older than Ace and Ace is older than Geo, but the combined ages of Ace and Geo is greater than the age of Fie. The age of Ace is

- (A) 2                      (B) 3                      (C) 4                      (D) 5                      (E) 6

17.  $PQR$  is an equilateral triangle,  $QS$  and  $QT$  divide  $\angle PQR$  into three equal parts. The size of  $\angle QTS$ , in degrees, is

- (A) 60                      (B) 70                      (C) 80  
(D) 90                      (E) 100



18. Jim's average score in his first six matches was 8.5. If all scores are whole numbers and his lowest score was 5, what is the lowest value which his highest score could have been?

- (A) 9                      (B) 10                      (C) 11                      (D) 12                      (E) 13



24. On a  $3 \times 5$  chessboard, a counter can move one square at a time along a row or a column, but not along any diagonal. Starting from some squares, it can visit each of the other 14 squares exactly once, without returning to its starting square. Of the 15 squares, how many could be the counter's starting square?
- (A) 5                      (B) 6                      (C) 7                      (D) 8                      (E) 9
- 

25. Each of Andrew, Bill, Clair, Daniel and Eva either always lies or is always truthful, and they know which each of them is.

Andrew says that Bill is a liar.

Bill says that Clair is a liar.

Clair says that Daniel is a liar.

Daniel says that Eva is a liar.

The largest possible number of liars among them can be

- (A) 1                      (B) 2                      (C) 3                      (D) 4                      (E) 5
- 

**For questions 26 to 30, shade the answer as an integer from 0 to 999 in the space provided on the answer sheet.**

**Question 26 is 6 marks, question 27 is 7 marks, question 28 is 8 marks, question 29 is 9 marks and question 30 is 10 marks.**

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26. Find the sum of all the two-digit integers,  $XY$ , between 10 and 99, which have the property that

$$\begin{array}{r} X \ Y \\ \times X \ Y \\ \hline \dots X \ Y \end{array}$$

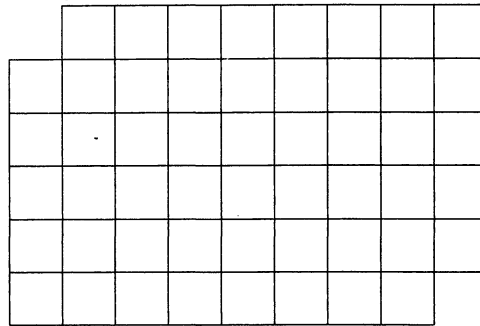

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27. A rectangular area measuring 3 units by 4 units on a wall is to be covered with 6 tiles each measuring 1 unit by 2 units. In how many ways can this be done?
- 

28. There are four lifts in a building. Each makes three stops, which do not have to be on consecutive floors or include the ground floor. For any two floors, there is at least one lift which stops on both of them. What is the maximum number of floors that this building can have?
-



29. A grid of squares measuring 9 units by 6 units has the two corners removed as shown:



How many squares of any size are contained within this grid?

- 
30. For any positive integer  $N$ , consider the digits which occur either in  $N$  or in  $7 \times N$ . Let  $m$  be the smallest digit among those digits. What is the largest possible value of  $m$ ?
-

## Worded Question Practice

1. In a batting innings, Phil hit 126 runs and Mario hit 19 runs. How many more runs did Phil hit compared to Mario?
2. Reggie and Angelo combine their packs of cards. Reggie has five sets of 13 cards and Angelo has three sets of 17 cards. How many cards are there in total?
3. If you share 30 biscuits among 5 children. How many do they get each?
4. Sala purchases some goods for a party at an outlet store and has \$100 to spend. She selects eight bottles of drink for \$2 each, 13 food packs at \$6 each and 18 party hats at 50 cents each. Does she have enough money to pay for all the items?
5. Friendly Taxis can take up to four passengers each. How many taxis are required to transport 59 people?
6. In a class, eight students have three TV sets at home, four have two TV sets, 13 have one TV set and two students have no TV sets. How many TV sets are there in total?
7. There are 15 children attending a birthday party and we order some pizzas. Each pizza will be sliced into 8 equal pieces. What is the smallest number of pizzas we need to order to make sure each child can eat three pieces?
8. Six different whole numbers, chosen from 1 to 100, add up to 100. What is the greatest possible value of the largest of these numbers?
9. A bag of sweets weighs 20g. How many bags would you need to make a 1kg package?
10. If I am facing North and I turn clockwise through 180 degrees. Which direction am I facing?
11. In a school of 120 children only  $\frac{1}{3}$  are girls. How many boys are in the school?
12. How many minutes are there in 4 and half-hours?
13. A sack of letters weighs 3 kg (without the weight of the sack). Each letter weighs 20g. How many letters are in the sack?
14. The perimeter of a square is twenty centimetres. What is the length of each side?
15. If a tortoise moves 15cm in 15 minutes. How far will it move in two hours?

16. James has travelled half of a journey. He has gone 12 kilometres. How long is his journey?
17. A TV costs \$225. Sally has saved \$87. How much more does she need to save to buy the TV?
18. In order to go on the roller coaster you have to be 1.5m tall. Darren is 161cm, Rob is 148cm and Mark is 135cm. Who can go on the ride? How much more do the others need to grow before the fair returns to town?
19. Darren and Rob went to the local fair. Darren has spent all his money. He spent 55c on a toffee apple, 75c on fairy floss, 90c on the roller coaster and 35c on the Laughing Clowns.
  - a. How much money did he start with?
  - b. Rob had three times as much money as Darren. How much did he start with?
20. Sally went to the movies with a friend one Sunday afternoon. Sally is in the queue to purchase her ticket. She is fifth from the back and there are 22 people in the queue. How many people are in front of her?
21. Grandma has an old family recipe for pizza dough. She can make 8 square pizza bases that are each 15cm in length. Grandma decided that the pizzas were way too large for her grandchildren and decided to make pizza bases that were only 5cm in length. How many small pizza bases will Grandma's recipe make?
22. The distance around a rectangular garden is 36m. One side measures 10m. What is the area of the garden?
23. Alex, Brad, Calvin, and Dennis are playing checkers. Each of the 4 boys played 2 games with every other player. How many games of checkers were played altogether?
24. Ariel ran an errand for her neighbour. She went to the store and bought 24 pieces of fruit. She purchased three times as many oranges as bananas. On her way home, Ariel accidentally dropped twice as many oranges as bananas. She still managed to deliver 15 pieces of fruit to her neighbour. How many oranges were there?