Monifieth High School

Mathematics Department

CfE Level 4

Revision Booklet

Replacement: £1

Revision of Scientific Notation

$a \times 10^b$ a must be between 1 and 10

eg: $90\,000 = 9 \times 10^4$ $6500 = 6.5 \times 10^3$

$0.0006 = 6 \times 10^{-4}$ $0.093 = 9.3 \times 10^{-2}$

1. Write the following numbers in **scientific notation**:–

(a) 7000 (b) 120 000 (c) 379 400

(d) 164·8 (e) 2 million (f) nineteen and a half million.

2. The population of the world on 1st September 2004 was 6·39 billion.

(a) Write this number out fully.

(b) Write this number in scientific notation.

3. Write each of the following numbers in full:–

(a) $7{\cdot}9 \times 10^3$ (b) $6{\cdot}37 \times 10^6$ (c) $9{\cdot}02 \times 10^5$ (d) 8×10^8

4. Write the following small decimal numbers in scientific notation:–

(a) 0·008 (b) 0·0654 (c) 0·00096 (d) 3 thousandths

5. Write each of the following numbers in full as decimals:–

(a) $2{\cdot}3 \times 10^{-5}$ (b) $1{\cdot}06 \times 10^{-1}$ (c) $4{\cdot}003 \times 10^{-6}$ (d) 9×10^{-8}

6. There are $1{\cdot}86 \times 10^6$ people living on the Island of Dunkelt.

Half of the residents of the island are women.

State how many women there are. (Answer in scientific notation).

7. The lowest point on dry land is the Dead Sea. It is 418 metres below sea level.

Write this in scientific notation.

8. The closest planet to Earth is Mars. On average it is about 150 000 000 miles away. Write this in scientific notation.

Revision of Powers and Roots

$4^3 = 4 \times 4 \times 4 = 64$ (4 to the power of 3)

$7^5 = 7 \times 7 \times 7 \times 7 \times 7 = 16807$

To get the square root, use the $\sqrt{}$ button on your calculator. You should know the square roots of perfect squares up to 100

1. Write down the value of a) 6^2 b) 2^3 c) 1^7 d) 3^4

2. Write down the value of a) $\sqrt{64}$ b) $\sqrt{49}$ c) $\sqrt{900}$ d) $\sqrt{10\,000}$

3. Use your calculator to find the answers to the following questions.

   a) 5^4 b) 8^5 c) $\sqrt{1089}$ d) $\sqrt{5184}$

4. Which is bigger and by how much?

   a) 4^3 or 3^4 b) 2^6 or 6^2

Revision of BIDMAS

The order we carry out operations is very important.

Brackets – always dealt with first

Indices/Power of

Dividing } these have equal precedence, so
Multiplying } we work from left to right as we read

Adding } the expression
Subtracting }

e.g. $10 + 2 \times 3$ do the multiplying first

$= 10 + 6$

$= 16$

$14 - 9 + 2$ equal precedence so

$= 5 + 2$ left to right

$= 7$

$(8 - 3)^2 - 4$ brackets first, then

$= (5)^2 - 4$ the power of,

$= 25 - 4$ then subtract

$= 21$

Now try the following questions, write out the question and put in all of the working

1. 7 + 3 x 4
2) 15 – 2 x 3
3) 7 + 8 – 2
4) 24 ÷ 8 + 4
5) 4.6 + 2.3 x 3
6) 18.9 – 3.1 x 5
7) 7.06 + 9.36 ÷ 9
8) 12.05 – 7.2 ÷ 8
9) 7.1 – (4.33 – 3.1)
10) 4.1 – (6.44 ÷ 7)
11) 72.4 – 1.5 x 40
12) 9.03 + 2.54 x 20
13) 39.3 – 0.71 x 30
14) (1128 ÷ 40) – 4.12

15) Evaluate 20% of £9.50 - £1.46

16) Evaluate 30% of £13.50 - £1.27

17) Evaluate 80% of £8.40 - £1.09

18) Evaluate 70% of £25.50 - £1.15

Revision of Circles

Diameter = 2 times the radius

Circumference of circle = π x Diameter

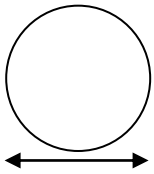
$$C = \pi D$$

Area = π x radius x radius

$$A = \pi r^2$$

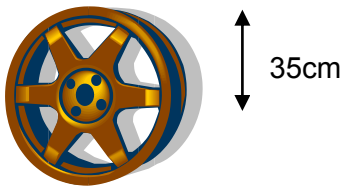
1. Calculate the CIRCUMFERENCE of each of the two circular objects shown.

(a)



16cm

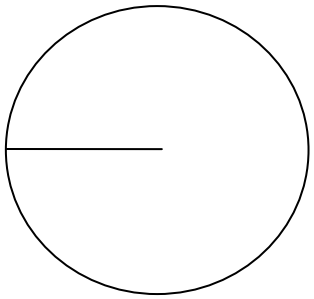
(b)



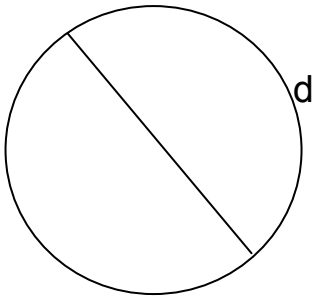
2. Calculate the AREA of each of these two circular shapes.

a)

radius = 9cm



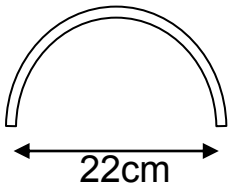
b)



diameter = 15cm

3. A pupil bent a plastic ruler into the shape of a semi-circle as shown.

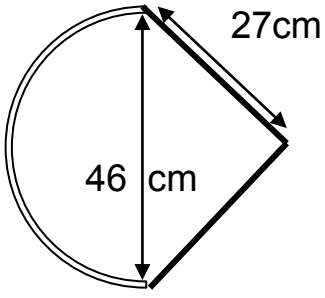
Calculate the actual length of the ruler.



4. A roundabout, in the town centre, has a **circumference** of 95 metres.

Calculate the **diameter** of the roundabout.

5. Calculate the total **perimeter** of this shape which consists of an isosceles triangle and a semi-circle.



Revision of Brackets and Factorising

3(x + 5) is the shorthand way of writing x + 5 + x + 5 + x + 5 = 3x + 15

4(6 – 2x) is the shorthand way of writing 6 – 2x + 6 – 2x + 6 – 2x + 6 – 2x = 24 – 8x

Rather than writing it out the long way, we multiply the value outside the bracket by each term inside the bracket. For example:-

2 (x – 7) becomes 2 times x – 2 times 7

= 2x – 14

Factorising

For any expression, we look to see if there is a common number (a number that divides into both values) or a common letter (a letter that appears in both values).

3a + 12b =3(a + 4b) as 3 goes into both 3 and 12

35x - 40y = 5(7x – 8y) as 5 goes into both 35 and 40

a – ab = a(1 – b) as letter a appears in both values

and a times 1 gives a, a times b gives ab

1. Multiply out the brackets:-

(a) 4(3x + 2) (b) 5(4x – 3y) (c) a (a + 3) (d) 3p (2p – 5q)

(e) –2(t – 3) (f) –a (a – b) (g) –3g (2 – 4g) (h) $-u^2(u - 2v)$

2. Multiply out the brackets and simplify:-

(a) 3(a + 2) – 4 (b) 5t + 2(t – 3) (c) 6 + 2(x + 3)

(d) 4(a + 2) + 3(a – 5) (e) 2(3x – 1) – 3(x – 2) (f) 2d – (1 – d)

3. Factorise the following expressions as fully as possible:-

(a) 4x + 8 (b) 24t – 16 (c) 12t + 18v (d) 9m – 6n

(e) $a - a^2$ (f) 10ax – 15ay (g) $3m^2 - 15m$

(h) $8xy^2 + 12x^2y$

Revision of Statistics Mean, Mode and Median

The mean (average) of a set of values is found using $\frac{\text{total of all the values}}{\text{number of values}}$

The mode is the most often occurring value in a set of values

The median is the middle value in a set of values which have been placed in order of size.

The range is the highest value subtract the lowest value in a data list

For example, using the data values 41, 47, 40, 54, 42, 43, 41,

If we put them in order first, 40, 41, 41, 42, 43, 47, 54

then the median value is 42

the mode is 41

the mean is $\frac{40 + 41 + 41 + 42 + 43 + 47 + 54}{7} = \frac{308}{7} = 44$

1) Find the mean in the following sets of data
a) 5, 6, 6, 8, 8, 9, 11, 12, 15, 20
b) 14, 12, 15, 11, 16, 12, 13, 15
c) 2.1, 2.7, 1.9, 2.4, 2.3, 3.0
d) 8.6, 7.6, 8.8, 8.1, 7.9

2) Seven matchboxes are opened and the matches are counted in each box
50, 46, 54, 49, 57, 52, 56

a) Calculate the mean number of matches
b) What is the median value of matches

3) Two women compare their weekly shopping bills. Calculate who spends more, on average.
Angie £102, £115, £124, £135

Brenda £114, £118, £120, £124, £132

Revision of Rotational Symmetry and Transformation

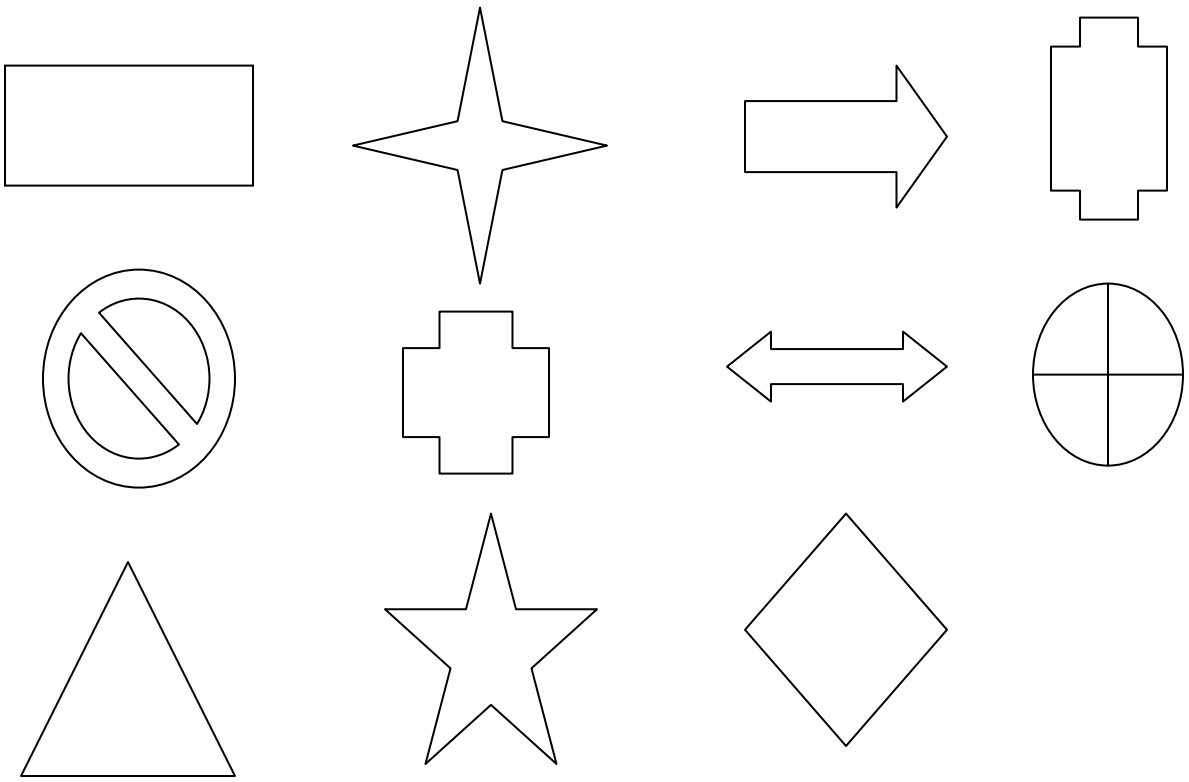
Rotational Symmetry: if a shape has a pin stuck in its centre point and the shape turned by 180^{o} around the point, if it fits back into its outline, it has half turn symmetry.

Some shapes can fit into their outline more than once; $\frac{1}{4}$ turn symmetry for example

If a shape fits into its outline 3 times, it can be said to have order 3.

For the following shapes, say whether it has $\frac{1}{2}$ turn or $\frac{1}{4}$ turn symmetry.

Write down what order each shape has.



1)Draw a four quadrant coordinate diagram from -8 to 8 on both axes.

Plot the points A(2, 2), B(2, -3), C(-3, -3) and D(-3, 2). Join up these points. Now move this shape 2 units left and 1 unit up. Write down the coordinates of all of the new points.

2) Draw a four quadrant coordinate diagram from -8 to 8 on both axes.

Plot the points A(-5, 0), B(-5, 4) and C(-3, 2). Join up these points. Now move this shape 4 units right and 2 units down. Write down the coordinates of all of the new points.

Revision of Fractions

Adding/Subtracting

If the denominator of each fraction is different, then we must multiply both to get the same number on the bottom of the fraction. Use equivalent fractions to do this. Then add/subtract the top line and leave the bottom line alone.

$\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ $\frac{2}{7} + \frac{4}{7} = \frac{6}{7}$ $\frac{5}{9} - \frac{3}{9} = \frac{2}{9}$ $\frac{2}{3} + \frac{1}{6} = \frac{4}{6} + \frac{1}{6} = \frac{5}{6}$

$\frac{4}{5} - \frac{3}{10} = \frac{8}{10} - \frac{3}{10} = \frac{5}{10} = \frac{1}{2}$ $\frac{3}{4} + \frac{2}{3} = \frac{9}{12} + \frac{8}{12} = \frac{17}{12} = 1\frac{5}{12}$

Add/subtract the following fractions, simplifying the answers where possible.

1) $\frac{7}{9} + \frac{1}{9}$ 2) $\frac{5}{13} + \frac{3}{13}$ 3) $\frac{5}{6} - \frac{3}{6}$ 4) $\frac{7}{8} - \frac{1}{8}$ 5) $\frac{4}{15} + \frac{7}{15}$

6) $\frac{7}{12} + \frac{5}{6}$ 7) $\frac{1}{2} + \frac{3}{8}$ 8) $\frac{3}{4} + \frac{11}{12}$ 9) $\frac{1}{3} + \frac{1}{5}$ 10) $\frac{1}{2} + \frac{2}{7}$

11) $\frac{5}{6} - \frac{1}{3}$ 12) $\frac{7}{12} - \frac{1}{4}$ 13) $\frac{1}{3} - \frac{1}{5}$ 14) $\frac{1}{2} + \frac{2}{7}$

Multiplying Fractions

To multiply fractions, convert them into improper fractions first (if necessary), then multiply the numerators(top line numbers) together, then multiply the denominators (bottom line numbers) together. Simplify where possible.

$\frac{1}{2} \times \frac{3}{7} = \frac{1 \times 3}{2 \times 7} = \frac{3}{14}$ $\frac{4}{5} \times \frac{7}{9} = \frac{4 \times 7}{5 \times 9} = \frac{28}{45}$

1) $\frac{1}{6} \times \frac{3}{8}$ 2) $\frac{2}{5} \times \frac{1}{8}$ 3) $\frac{4}{7} \times \frac{3}{8}$ 4) $\frac{3}{4} \times \frac{8}{15}$ 5) $\frac{2}{3} \times \frac{9}{14}$

6) $\frac{2}{3} \times \frac{5}{12}$ 7) $1\frac{1}{2} \times \frac{1}{6}$ 8) $1\frac{2}{3} \times 1\frac{1}{8}$

Revision of Probability

The probability of an event happening can be thought of as a simple fraction and can only take values from 0 to 1.

For example:

The probability of Christmas day being on June 29th is 0 impossible

The probability of getting an even number on a normal die is ½ even chance

The probability of the day after Thursday being Friday is 1 certain

To calculate the probability of an event happening = $\frac{\text{number of favourable ways}}{\text{number of possible ways}}$

Example. A bag contains 5 red balls, 4 blue balls and 1 yellow ball. If a ball is chosen at random, what is the probability of it being blue?

P(blue) = $\frac{\text{4 (blue balls)}}{\text{10(balls altogether)}} = \frac{2}{5}$ P(yellow) = $\frac{\text{1 (yellow ball)}}{\text{10(balls altogether)}} = \frac{1}{10}$

1) A normal die is rolled and the number on top is written down.
   a) How many numbers are on a normal die?
   b) What is the probability it will be a 3?
   c) What is the probability it will be a 6?
   d) What is the probability it will be a number bigger than 2?
   e) What is the probability it will be a 9?

2) A normal pack of 52 cards is shuffled and the top card is turned over.
   a) What is the probability the card is black?
   b) What is the probability the card is a diamond?
   c) What is the probability the card is a King?
   d) What is the probability the card is a red Jack?

3) A class of 18 girls and 12 boys line up randomly outside a classroom?
   a) What is the probability the first pupil in the line is a girl?
   b) What is the probability the first pupil in the line is a boy?

4) A woman has 5 white, 3 blue, 2 red and 2 black shirts in her wardrobe on Sunday night.
   a) If she picks one at random on Monday morning, what is the probability it will be white? She wears it, then puts it in the wash basket.
   b) On Tuesday morning, what is the probability she picks another white shirt?

Revision of 2 D Shapes

Remember that: area of a rectangle = l x b area of a triangle = $\frac{1}{2}$ x base x height

We can either split up quadrilaterals into the above shapes and work out the area that way or we can use the formulae:-

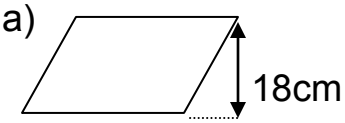
Area of a parallelogram = base x height

Area of a rhombus/kite = $\frac{1}{2}$ x diagonal x diagonal

Area of trapezium = = $\frac{1}{2}$ x (a + b) x height

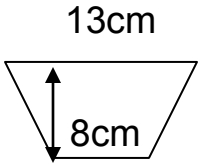
1. Calculate the areas of each of these quadrilaterals

a)



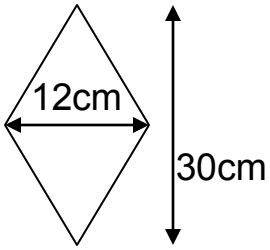
26cm

b)

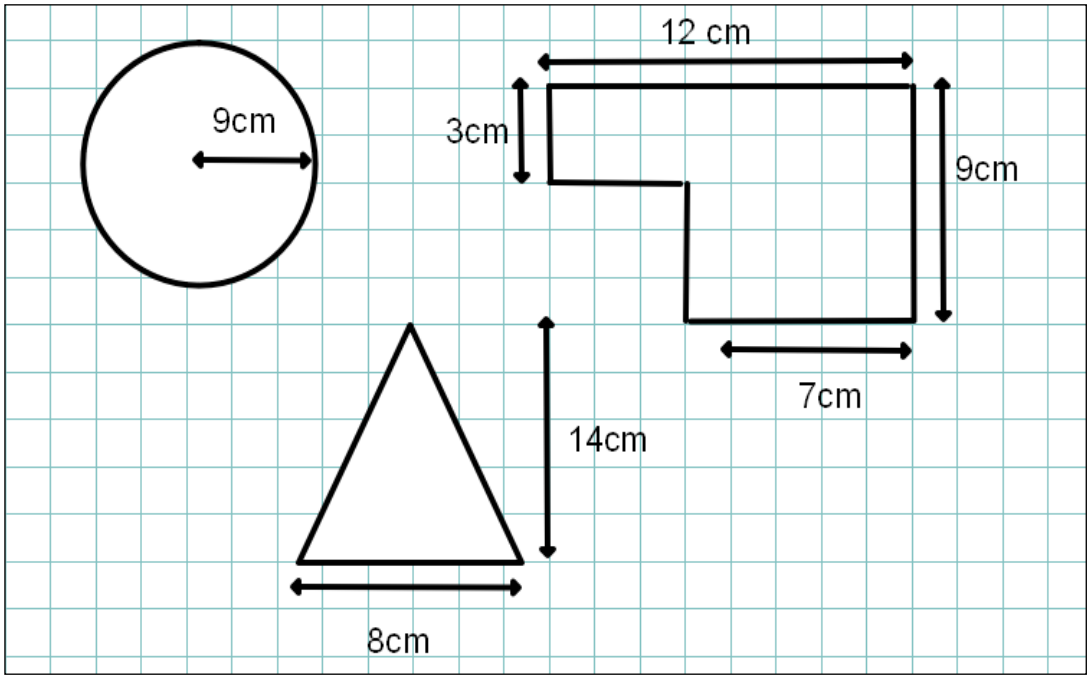


10.5cm

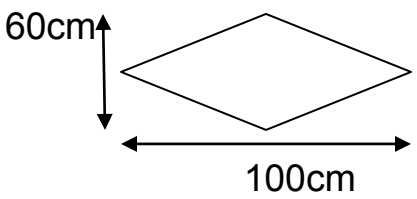
c)

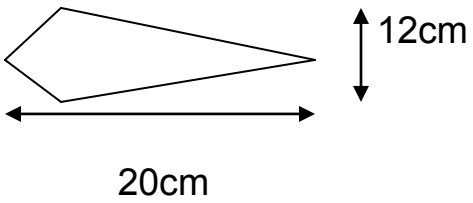


2. Find the areas of the following shapes.



3. Find the areas of the following shapes.

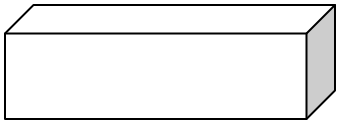




Revision of Volumes of Prisms

Volume of a cuboid = l x b x h

Volume of a prism = Cross sectional area x length



This box has length 10cm, breadth 4cm and height 4cm.

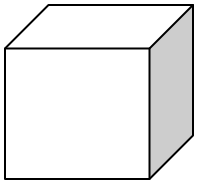
Its volume is V = l x b x h

= 10 x 4 x 4

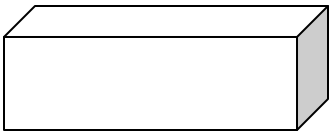
= 160 cm^3

1 litre = 1000cm^3 1millilitre = 1cm^3

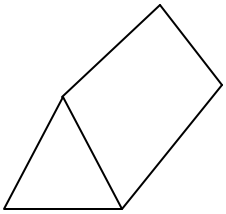
Calculate the volume of the following shapes.

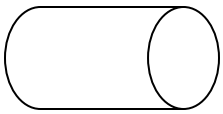
1.  Cube of side 3cm

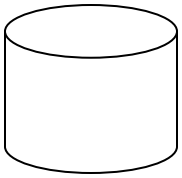
2. Cuboid with length 7cm, breadth 5cm and height 4cm



3. A triangular prism with cross section of 25cm^2 and length 10cm.



4. A cylinder with ends 50cm^2 and length 23cm. 

5. A cylinder with ends 42cm^2 and height 15cm. 

6.

A heart shaped box of chocolates has a cross sectional area of 125 cm^2 and has two layers of chocolates in it. Each layer is 2.5cm high.

What is the volume of the box?

Revision of Equations and Inequations

$x + 6 = 10$	$2x - 7 = 5$	$3(x + 1) = 18$	$4x + 7 = 2x + 23$
$x = 4$	$2x = 12$	$3x + 3 = 18$	$2x = 16$
	$x = 6$	$3x = 15$	$x = 8$
		$x = 5$	

1) Solve the following equations. Remember to get all of the x's on one side of the equation first.

a) $5x = x + 24$ b) $7x + 2 = 2x + 17$ c) $20x - 3 = 13x + 18$

c) $9x + 2 = 3x + 38$ d) $9x - 6 = 6x + 12$ e) $8x + 4 = 12x - 24$

2) Solve these equations by first multiplying out the bracket, then collect x's on one side and numbers on the other.

a) $2(x + 4) = 28$ b) $3(x + 5) = 36$ c) $5(2x - 3) = 25$

d) $2(x + 5) + 6 = 18$ e) $4(x + 1) - 7 = 13$ f) $9(4x - 1) - 1 = 62$

3) Solve these equations, by first of all collecting the numbers on one side, then multiplying every term by the denominator of the fraction.

a) $\frac{1}{2}x = 9$ b) $\frac{1}{3}x + 1 = 3$ c) $\frac{1}{4}x + 1 = 5$

d) $\frac{1}{2}x - 4 = 6$ e) $\frac{2}{3}x - 2 = 8$ f) $\frac{1}{10}x + 9 = 11$

4) From the list of numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, write out all the numbers which make the following inequalities true: for example, $x > 8$

$x = 9, 10$

a) $a > 7$ b) $b < 3$ c) $c \leq 4$ d) $d \geq 10$

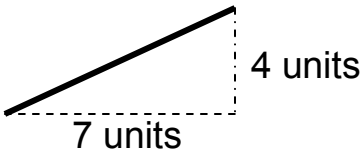
5) Solve these inequations, leaving your answer in the form $x > 3$ etc.

a) $x + 2 < 7$ b) $5x < 20$ c) $2x + 6 \leq 18$ d) $3x - 5 \geq 4$

e) $4x + 11 < 51$ f) $2(x + 5) \geq 16$ g) $2(3x + 4) < 32$ h) $7(2x - 3) \geq 21$

Revision of Gradient and Straight Line

The gradient of a line is the vertical distance / horizontal distance



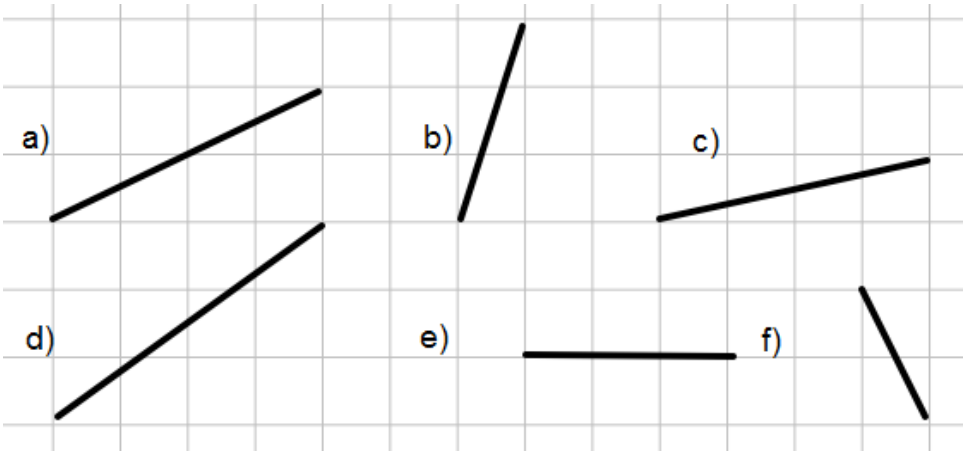
Gradient = m = $\frac{4}{7}$

A vertical line through points (2, 3), (2, 4) and (2, 5) has equation x = 2

A horizontal line through points (3, 5), (4, 5) and (5, 5) has equation y = 5

To draw a line, given its equation, we substitute x values 0, 1, 2, 3 etc. into the table to get the matching y values, then we plot the points on a coordinate diagram.

For the following lines, calculate their gradient



1. Copy and complete the table using the equation y = 2x + 1.

x	0	1	2	3	4
y = 2x + 1					

b) Draw a set of axes, plot the points and draw the straight line y = 2x + 1.

2. Copy and complete the table using the equation y = 3x – 1.

x	0	1	2	3	4
y = 3x – 1					

b) Draw a set of axes, plot the points and draw the straight line y = 3x – 1.

3. 3. Copy and complete the table using the equation y = $\frac{1}{2}$x + 2.

x	0	1	2	3	4
y = $\frac{1}{2}$x + 2					

c) Draw a set of axes, plot the points and draw the straight line y = $\frac{1}{2}$x + 2.

Revision of Change the Subject

When we change the subject of a formula, we want to get a different letter on its own on one side of the equals sign. We do this by reversing the operations that have been carried out on the other values in the expression: subtract if something is added on, divide if the value you want is multiplied.

e.g. cost =number of books times price

$C = N \times P$ so to get the price on its own, we have to divide

$\frac{C}{N} = \frac{N \times P}{N}$

$\frac{C}{N} = P$ P is now the subject of the formula

e.g. $2a + 4 = b$ subtract 4 from each side

$2a = b - 4$ now divide by 2

$a = \frac{b - 4}{2}$ a is now the subject of the formula

e.g. Perimeter = $2(L + B)$ so to get the length on its own

$\frac{P}{2} = (L + B)$ divide by 2 first

then subtract B

$\frac{P}{2} - B = L$ L is now the subject of the formula

Now try these questions. Rearrange the subject of each formula to the letter indicated in the square brackets.

1. $x = y + 3$ [y] 2. $p = q - 8$ [q] 3. $a = b + c$ [b] 4. $d = e - f$ [e]

5. $x = \frac{y}{4}$ [y] 6. $p = 7q$ [q] 7. $S = \frac{D}{T}$ [D] 8. $S = \frac{D}{T}$ [T]

9. $a = 3x + 2$ [x] 10. $g = 4h - 5$ [h] 11. $y = mx + c$ [x]

12. $p = 3(q + 4)$ [q] 13. $m = n(q + 6)$ [q] 14. $a = b(c - d)$ [b]

15. The formula for the cost of hiring a car is $C = F + 5k$, where C is the cost, F is the fixed charge and k is the number of kilometres travelled. Change the subject of the formula to k.

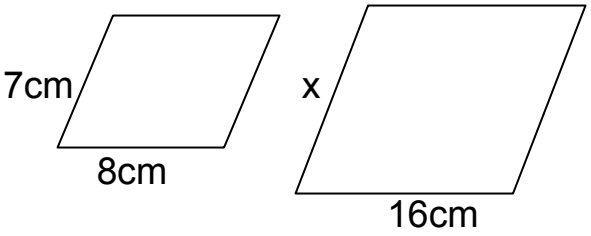
16. The formula for the volume of a box is $V = l \times b \times h$, where l is the length, b is the breadth and h is the height. Change the subject to a) l b) h c) b

Revision of Similarity

Shapes are said to be similar if they are the "same shape" and have the same angles, but one is an enlargement of the other.

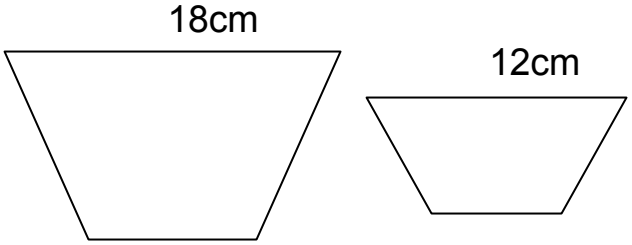
Compare matching or corresponding side lengths to find the scale factor:

Enlargement scale factor = $\frac{\text{big}}{\text{small}}$



Scale factor = $\frac{16}{8} = 2$

Reduction Scale factor = $\frac{\text{small}}{\text{big}}$

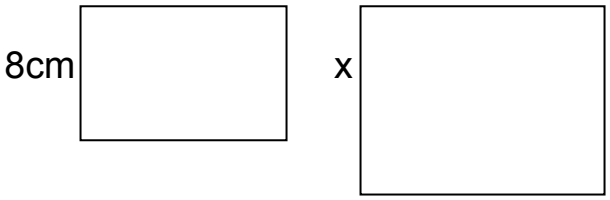


Scale factor = $\frac{12}{18} = \frac{2}{3}$

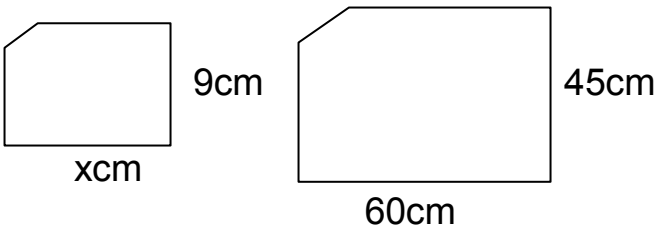
New length = SF x known side
= 2 x 7
= 14cm

1.Work out the scale factor and the length of side x in the following shapes:

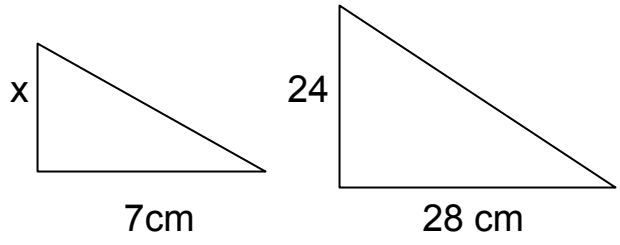
a)



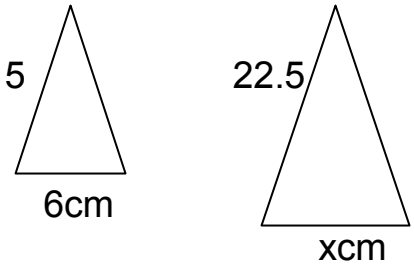
b)



c)

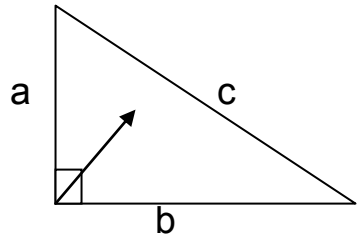


d)



2. On a scale drawing 1cm = 50m. In real life, how long is a 6 cm line?
3. On a scale drawing 1cm = 0.5m. In real life, how long is a 9 cm line?
4. Using a scale of 1cm = 2m, a 14 metre line would be how long on the drawing?
5. Using a scale of 1cm= 50 miles, 225 miles would be drawn as what length?

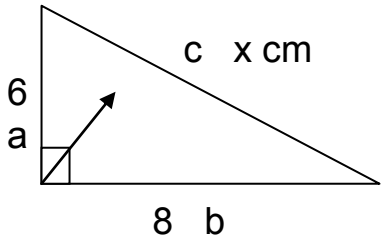
Revision of Pythagoras $a^2 + b^2 = c^2$



Always label your diagram. The longest side (opposite the right angle) is labelled c.
The other two short sides are labelled a and b.
(It does not matter which is a and which is b)

$a^2 + b^2 = c^2$

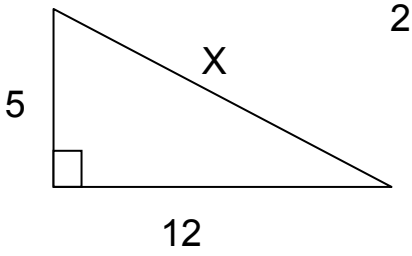
Then substitute in the values you have on the diagram.



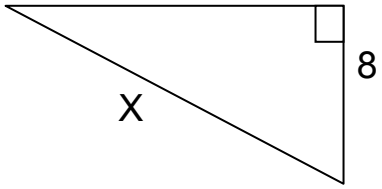
$a^2 + b^2 = c^2$
$6^2 + 8^2 = x^2$
$36 + 64 = x^2$
$100 = x^2$
$\sqrt{100} = x$
$10 = x$

Now do the same thing for the following diagrams.

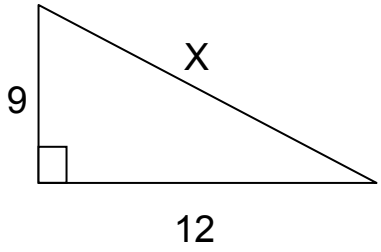
1)



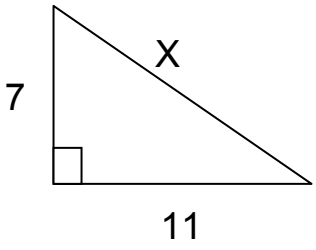
2)



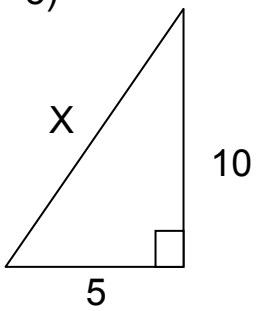
3)



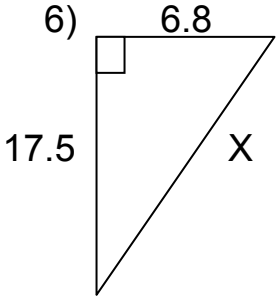
4)



5)

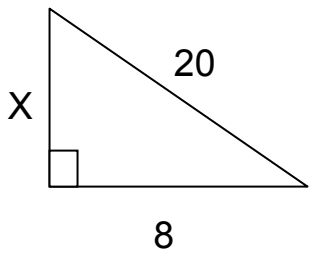


6)

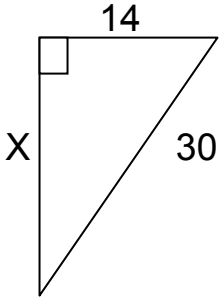


To find a short side, we use the same formula, but do $c^2 - b^2$ or $c^2 - a^2$
Find the short sides in these diagrams

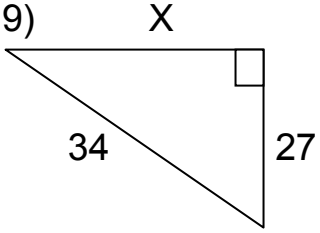
7)



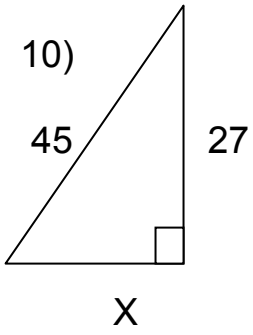
8)



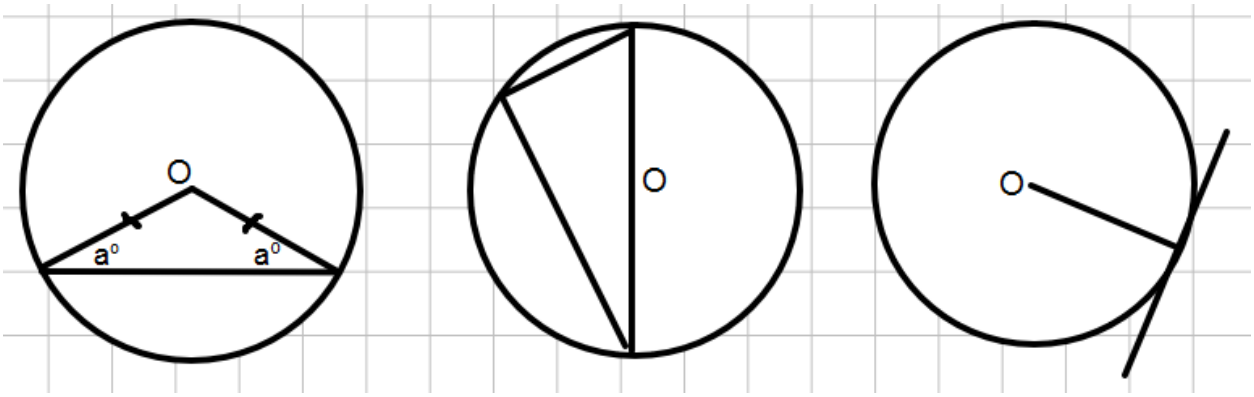
9)



10)



Revision of Angles in Circles

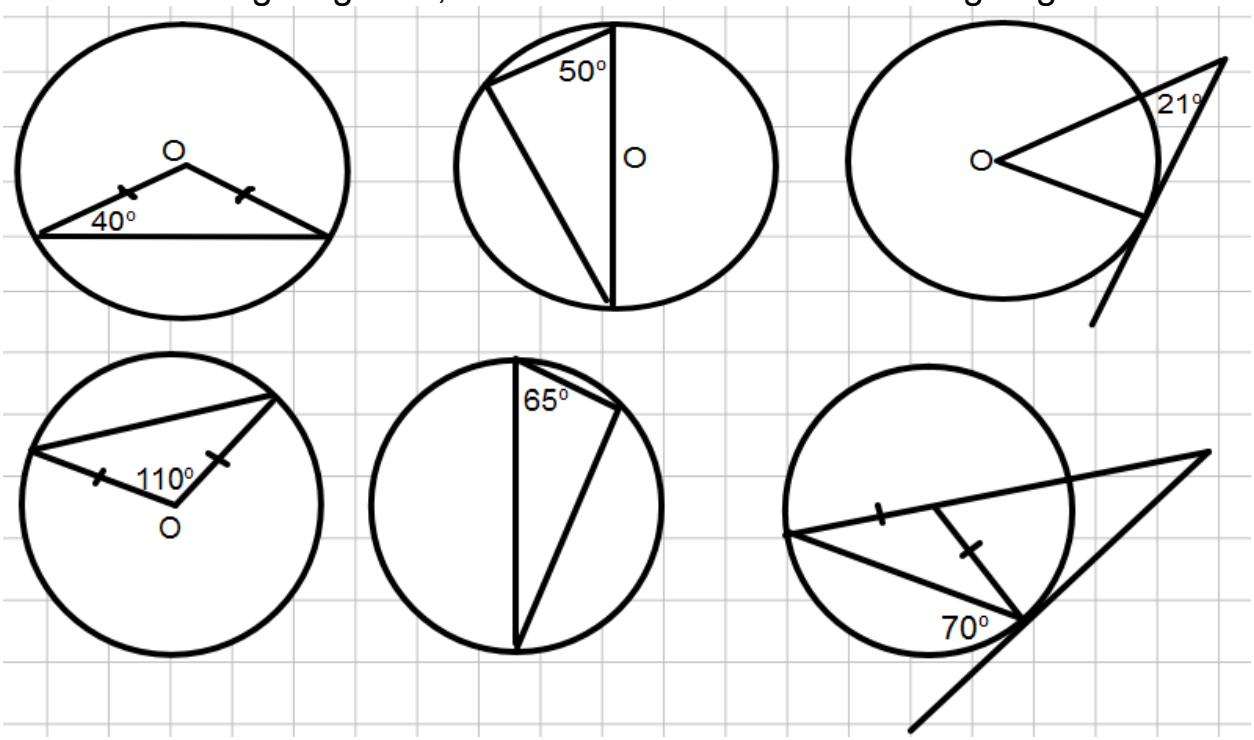


Radii form isosceles triangles

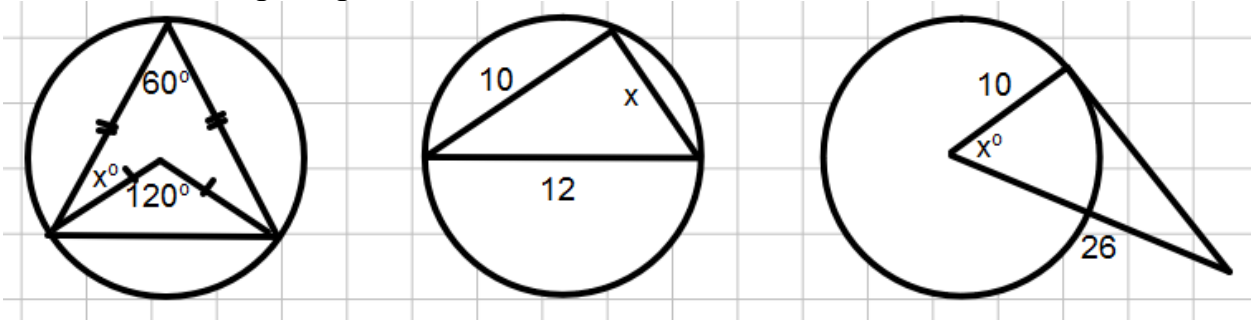
The angle in a semi-circle is a right angle.

The tangent and radius form a right angle at the point of contact.

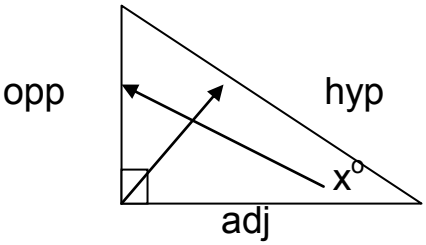
For the following diagrams, calculate the size of the missing angles:



For the following diagrams, find the value of x

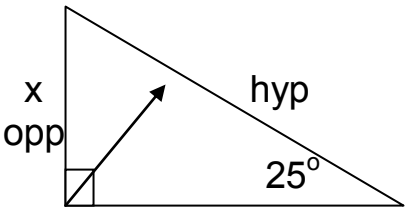


Revision of Trigonometry SOH CAH TOA



Always label your diagram. The longest side (opposite the right angle) is labelled hyp.
The side opposite the given angle(x^o or a numeric value) is the opposite.
The side that is not marked is called the adjacent

Write SOH CAH TOA and tick the sides you are given or the side you want to find.
Choose the ratio with two ticks



$\tan x^o = \frac{opp}{adj}$

$\tan 25^o = \frac{x}{16}$

$16\tan 25^o = x$

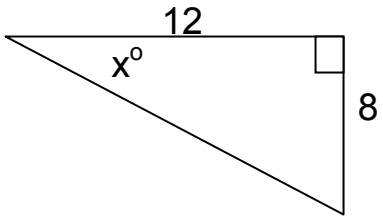
$7.46 = x$

If you are trying to find an angle you follow the same initial steps, until you have substituted into the formula and then:

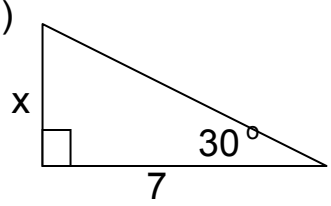
$\tan x^o = \frac{8}{12}$

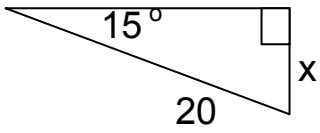
$x^o = \tan^{-1}(8 \div 12)$

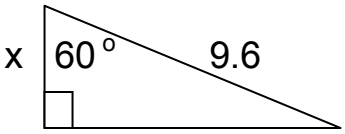
$= 33.7^o$

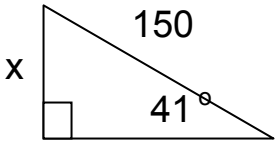


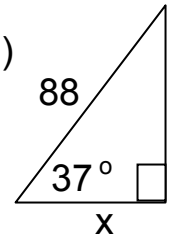
Now do the same thing for the following diagrams.

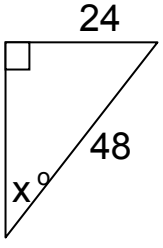
1)


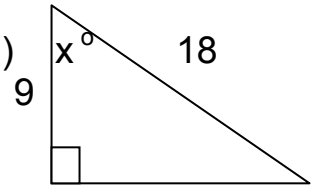
2)


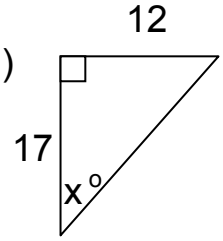
3)


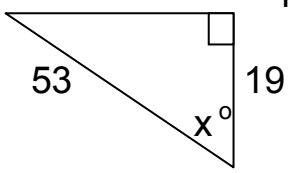
4)


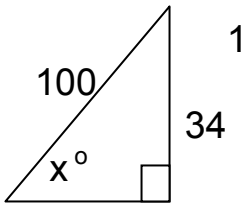
5)


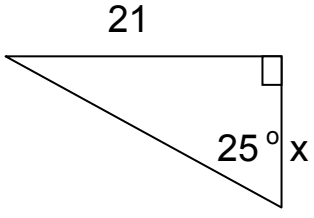
6)


7)


8)


9)


10)


11)


Answers

Scientific Notation

1a) 7×10^3 b) 1.2×10^5 c) 3.794×10^5 d) 1.648×10^2
e) 2×10^6 f) 1.95×10^7 2a) 6 390 000 000 b) 6.39×10^9
3a) 7900 b) 6370000 c) 902000 d) 800 000 000
4a) 8×10^{-3} b) 6.54×10^{-2} c) 9.6×10^{-4} d) 3×10^{-3}
5a) 0.000023 b) 0.106 c) 0.000004003 d) 0.00000009
6) 9.3×10^5 women 7) $-418 = -4.18 \times 10^2$ 8) 1.5×10^8

Powers and Roots

1a) 36 b) 8 c) 1 d) 81 2a) 8 b) 7 c) 30
d) 100 3a) 625 b) 32768 c) 33 d) 72
4a) $4^3 = 64$, $3^4 = 81$, 3^4 bigger by17 b) $2^6 = 64$, $6^2 = 36$, 2^6 bigger by 28

BIDMAS

1)19 2) 9 3) 13 4) 7 5) 11.5 6) 3.4 7) 8.1
8) 11.15 9) 5.87 10) 3.18 11) 12.4 12) 59.83 13) 18 14) 24.08
15) £0.44 16) £2.78 17) 5.63 18) £16.70

Circles

1a) 50.27cm b) 219.91cm 2a) $254.47cm^2$ b) $176.71cm^2$ 3) 34.56cm
4) 30.24m 5) 72.26 + 27 + 27 = 126.26cm

Factorising

1a) $12x + 8$ b) $20x - 15y$ c) $a^2 + 3a$ d) $6p^2 - 15pq$ e) $-2t + 6$
f) $-a^2 + ab$ g) $-6g + 12g^2$ h) $-u^3 + 2uv$
2a) $3a + 2$ b) $7t - 6$ c) $2x + 12$ d) $7a - 7$ e) $3x + 8$
f) $3d - 1$
3a) $4(x + 2)$ b) $8(3t - 2)$ c) $6(2t + 3v)$ d) $3(3m - 2n)$ e) $a(1 - a)$
f) $5a(2x - 3y)$ g) $3m(m - 5)$ h) $4xy(2y + 3x)$

Statistics

1a) 10 b) 13.5 c) 2.88 d) 8.2
2a) 52 matches b) 52 matches
3) Angie: £119, Brenda: £121.60

Rotational Symmetry

1a) 2 b) 1 c) 1 d) 1 e) 1 f) 1 g) 2
h) 4 i) 1 j) 1 k) 2

Fractions

1) $\frac{8}{9}$ 2) $\frac{8}{13}$ 3) $\frac{2}{6}$ 4) $\frac{6}{8}$ 5) $\frac{11}{15}$ 6) $\frac{17}{12}$ 7) $\frac{7}{8}$

8) $\frac{20}{12}$ 9) $\frac{8}{15}$ 10) $\frac{11}{14}$ 11) $\frac{2}{6}$ 12) $\frac{4}{12}$ 13) $\frac{2}{15}$ 14) $\frac{11}{14}$

Multiplying

1) $\frac{3}{48}$ 2) $\frac{2}{40}$ 3) $\frac{12}{56}$ 4) $\frac{24}{60}$ 5) $\frac{18}{42}$ 6) $\frac{10}{36}$ 7) $\frac{3}{12}$
8) $\frac{45}{24}$

Probability

1a) 6 b) P(3) = $\frac{1}{6}$ c) P(6) = $\frac{1}{6}$ d) P(>2) = $\frac{4}{6}$ e) P(9) = 0
2a) P(black) = $\frac{26}{52}$ b) P(diamond) = $\frac{13}{52}$ c) P(King) = $\frac{4}{52}$ d) P(Red Jack) = $\frac{2}{52}$
3a) P(girl) = $\frac{18}{30}$ b) P(boy) = $\frac{12}{30}$ 4a) P(white) = $\frac{5}{12}$ b) P(white) = $\frac{4}{12}$

2D Shapes

1a) 468 cm^2 b) 94 cm^2 c) 180 cm^2 2a) Circle = $254.5cm^2$ b) Triangle = 56 cm^2
c) Composite shape = 78 cm^2 3a) 3000 cm^2 b) $120cm^2$

Data Organisation

1a) 140 cm b) 58kg c) Sam and Tim d) Sam and Fred e) 35cm

2a) 37 b) 74 c) 62 d) No one aged 40 – 49

3a) 25% b) 12.5% c) 200 pupils d) 50 pupils

4b) Bob 5a) 60 b) 70 7a) $\frac{1}{4}$ b) $\frac{1}{3}$ c) 6 hours

d) 4 hours

Volume

1) 27 cm^3 2) 140 cm^3 3) 250 cm^3 4) 1150 cm^3 5) 630 cm^3 6) 625cm^3

Gradient

1a) m = $\frac{1}{2}$ b) m = 3 c) m = $\frac{1}{4}$ d) m = $\frac{3}{4}$ e) m = 0 f) m = – 2

1)

X	0	1	2	3	4
Y = 2x + 1	1	3	5	7	9

2)

X	0	1	2	3	4
Y = 3x - 1	-1	2	5	8	11

3)

X	0	1	2	3	4
Y = $\frac{1}{2}$x + 2	2	2.5	3	3.5	4

Equations and Inequations

1a) x = 6 b) x = 3 c) x = 3 d) x = 6 e) x = 6

f) x = 7 2a) x = 10 b) x = 7 c) x = 4 d) x = 1

e) x = 4 f) x = 2 3a) x = 18 b) x = 6 c) x = 16

d) x = 20 e) x = 15 f) x = 20 4a) 8, 9, 10 b) 1, 2

c) 1, 2, 3, 4 d) none 5a) x < 5 b) x < 4 c) x ≤ 6

d) x ≥ 3 e) x < 10 f) x ≥ 3 g) x < 4 h) x ≥ 3

Change the subject

1) y = x – 3 2) q = p + 8 3) b = a – c 4) e = d + f 5) y = 4x

6) q = $\frac{p}{7}$ 7) D = ST 8) T = $\frac{D}{S}$ 9) x = $\frac{a-2}{3}$ 10) h = $\frac{g+5}{4}$

11) x = $\frac{y-c}{m}$ 12) q = $\frac{p}{3}$ – 4 13) q = $\frac{m}{n}$ – 6 14) b = $\frac{a}{c-d}$ 15) k = $\frac{C-F}{5}$

16a) l = $\frac{V}{bh}$ b) h = $\frac{V}{bl}$ c) b = $\frac{V}{lh}$

Similarity

1a) SF = 3; x = 24cm b) SF = $\frac{1}{5}$; x = 12cm c) SF = $\frac{1}{4}$; x = 6cm d) SF = 4.5; x = 27cm

2) 300m 3) 4.5m 4) 7cm 5) 4.5cm

Pythagoras

1) x = 13 2) x = 17 3) x = 15 4) x = 13.04 5) x = 11.18

6) x = 18.77 7) x = 18.33 8) x = 26.53 9) x = 20.66 10) x = 36

Angles in Circles

1) 40, 100
2) 90, 40
3) 90, 69
4) 35, 35
5) 90, 25
6) small: 20, 20, 140; big: 90, 40, 50
7) x = 30
8) x = 6.63
9) x = 67.4

Trigonometry

1) x = 4.04
2) x = 5.18
3) x = 4.8
4) x = 98.4
5) x = 70.28
6) x = 30
7) x = 60
8) x = 35.2
9) x = 69
10) x = 19.9
11) x = 45