



JP Maths

Revision

GCSE MATHS

Knowledge Tests – Set 1

HIGHER TIER

TOPICS COVERED:



NUMBER



ALGEBRA



RATIO AND PROPORTION



GEOMETRY AND MEASURES



PROBABILITY



STATISTICS



GRAPHS



You've got this! ❤️



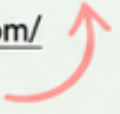
JP Maths

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before watching the
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HIGHER TIER

Number: Knowledge Test 1



INSTRUCTIONS

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You've got this! 

HCF, LCM and Product of Primes

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1. Find the HCF and LCM of 84 and 210.

.....
(Total for Question 1 is 3 marks)

Working With Fractions

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2. Evaluate:

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Give your answer as a mixed number.

.....
(Total for Question 2 is 2 marks)

Percentages of Amounts

★	★★	★★★
☐	☐	☐

3. A school has 800 students.



60% are girls.

25% of the girls play a musical instrument.

How many girls play a musical instrument?

.....
(Total for Question 3 is 2 marks)

Reciprocals

★	★★	★★★
☐	☐	☐

4. Write down the reciprocal of 1.25.

.....
(Total for Question 4 is 1 mark)

Recurring Decimals

★	★★	★★★
☐	☐	☐

5. Convert $0.\dot{7}\dot{2}$ to a fraction.

Give your answer in its simplest form.

.....
(Total for Question 5 is 2 marks)

6. Mia invests £10 000.

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★★★
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After 5 years the investment is worth £12 166.53.

The investment earned the same rate of compound interest every year.

Calculate the annual rate of interest.

Give your answer to 1 decimal place.

.....
(Total for Question 6 is 3 marks)

Percentage Change

7. The price of a jumper increases from £40 to £46.

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Calculate the percentage increase.

.....
(Total for Question 7 is 3 marks)

Reverse Percentages

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8. The normal price of a sofa is reduced by 35%.

The sale price is £494.

Work out the normal price of the sofa.

.....

(Total for Question 8 is 2 marks)

Working With Indices

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9. Simplify $(2x^3y^2)^3$



.....

(Total for Question 9 is 2 marks)

Fractional and Negative Indices

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10. Work out $\left(\frac{81}{16}\right)^{\frac{3}{4}}$



.....

(Total for Question 10 is 2 marks)

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11. Express $\left(\frac{1}{\sqrt{5}}\right)^5$ in the form $\frac{\sqrt{b}}{c}$ where b and c are integers.



.....
(Total for Question 11 is 2 marks)

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12. Calculate:
 $(9 \times 10^{-3}) \div (3 \times 10^2)$



Give your answer in standard form.

.....
(Total for Question 12 is 2 marks)

13. A distance, D, is measured as 6300 m to 2 significant figures.

Write down the error interval for D.

.....
(Total for Question 13 is 2 marks)

14.

$$k = \frac{3x^2}{y}$$

$x = 20$ correct to the nearest 10.

$y = 10$ correct to the nearest 5

Find the lower bound for k .

.....
(Total for Question 14 is 4 marks)

Score:

I am confident with:

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I need to work on:

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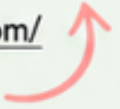
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HIGHER TIER

Algebra: Knowledge Test 1



INSTRUCTIONS

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INFORMATION

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ADVICE

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- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.



You've got this!

Expanding Single Brackets

1. Expand and simplify $-x(x + 1) - 2x(x - 9)$

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.....
(Total for Question 1 is 2 marks)

Expanding Double Brackets

2. Expand and simplify $(2x + 3)(x - 4)$

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.....
(Total for Question 2 is 2 marks)

Expanding Triple Brackets

3. Expand and simplify $(x + 1)(x + 2)(x + 3)$

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.....
(Total for Question 3 is 3 marks)

Factorising Single Brackets

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4. Factorise $2a + 6b - 10c$

.....
(Total for Question 4 is 1 mark)

Factorising Quadratics (Monic)

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5. Factorise $x^2 - 15x + 54$

.....
(Total for Question 5 is 2 marks)

Factorising Quadratics (Non-Monic)

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6. Factorise $3x^2 + 7x + 2$

.....
(Total for Question 6 is 2 marks)

The Difference of Two Squares

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7. Factorise $25 - y^2$

.....
(Total for Question 7 is 1 mark)

Solving Linear Equations

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8. Solve $\frac{2x + 3}{5} = \frac{x - 1}{2}$

.....
(Total for Question 8 is 3 marks)

Forming and Solving Equations from Worded Problems

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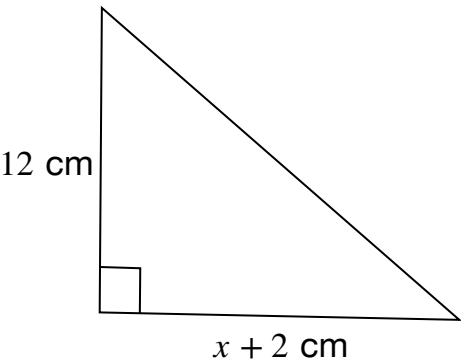
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9. The area of the below triangle is 42 cm².

Work out the value of x .



.....
(Total for Question 9 is 3 marks)

Solving Quadratic Equations by Factorising

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10. Solve $3x^2 + 10x + 3 = 0$

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(Total for Question 10 is 3 marks)

The Quadratic Formula

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11. Solve $x^2 + 7x + 4 = 0$

Give your answers to 3 significant figures

.....
(Total for Question 11 is 3 marks)

Changing the Subject (Basic)

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12. Make r the subject of $A = \pi r^2$

.....
(Total for Question 12 is 2 marks)

Changing the Subject With Multiple x terms

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13. Make x the subject of $y = \frac{3x + 2}{x - 1}$

.....
(Total for Question 13 is 4 marks)

Solving Linear Inequalities

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14. Solve $-5 \leq 4x + 3 < 11$

.....
(2)

Write down possible integer values of x

.....
(1)
(Total for Question 14 is 3 marks)

Solving Quadratic Inequalities

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15. Solve $x^2 + 5x + 6 > 0$

.....
(Total for Question 15 is 3 marks)

Sequences

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16. Find the nth term of the following sequence.

4, 7, 10, 13...

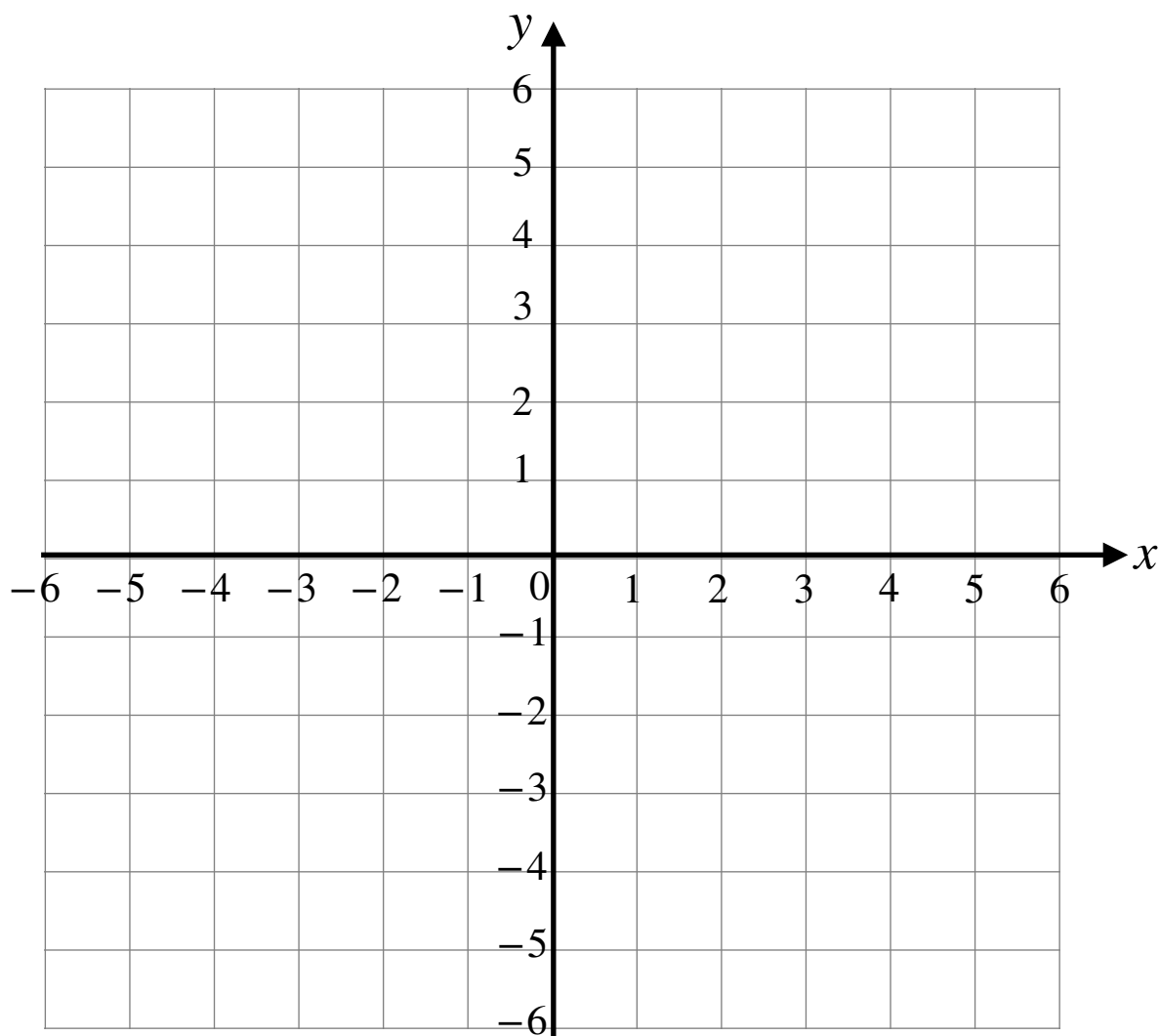
.....
(Total for Question 16 is 2 marks)



17. On the grid, show the region that satisfies the following inequalities.

$$x \geq -1 \quad y \leq 3 \quad x + y \leq 4$$

Label the region R



(Total for Question 17 is 3 marks)

Quadratic Sequences



18. Here are the first five terms of a quadratic sequence.

4, 9, 16, 25, 36, ...

Find an expression for the n th term of this sequence.

.....
(Total for Question 18 is 3 marks)

Geometric Sequences



19. Here are the first two terms of a geometric sequence.

3, 6 ...

Write down the next three terms.

.....
(Total for Question 19 is 1 mark)

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20. Solve the simultaneous equations

$2x - 3y = 7$

$3x + 5y = 1$

.....
(Total for Question 20 is 4 marks)

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21. Solve the simultaneous equations

$x^2 + y^2 = 10$

$y = x + 2$

.....
(Total for Question 21 is 4 marks)

22. Show that $\frac{2}{x-1} + \frac{3}{x+1}$ can be written in the form $\frac{ax+b}{x^2-1}$ where a and b are integers.

.....
(Total for Question 22 is 3 marks)

23. Write $x^2 + 8x + 4$ in the form $(x + a)^2 + b$ where a and b are integers to be determined.

.....
(Total for Question 23 is 2 marks)

24. The equation of a circle is $(x - 3)^2 + (y + 1)^2 = 25$.

(a) Write down the radius of the circle

(b) Write down the coordinates of the centre

.....
(1)

.....
(1)
(Total for Question 24 is 2 marks)

25. Prove algebraically that the sum of any two consecutive even integers is two more than a multiple of four.

(Total for Question 25 is 2 marks)

26. (a) Show that

$$x^3 + 5x - 12 = 0$$

has a solution between $x = 1$ and $x = 2$.

(2)

(b) Show that the equation can be rearranged to give

$$x = \frac{12}{x^2 + 5}$$

(1)

(c) Starting with $x_0 = 1.6$, use

$$x_{n+1} = \frac{12}{x_n^2 + 5}$$

three times to estimate the solution.

Give your answer to 4 decimal places.

.....
(3)

(Total for Question 26 is 6 marks)

27. $f(x) = x^2 + 1, x > -1$
 $g(x) = 2x - 3$

(a) Find $g^{-1}(x)$

(b) Solve $fg(x) = gf(x)$

Give your answers to 3 significant figures.

.....
(2)

.....
(3)

(Total for Question 27 is 5 marks)



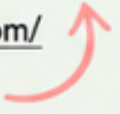
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Ratio and Proportion: Knowledge Test 1



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You've got this! 

Ratio

1. A company produces silver and gold medals in the ratio 7 : 4.

★

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There are 36 more silver medals than gold medals.

How many medals are produced altogether?

.....
(Total for Question 1 is 3 marks)

Best Buys

2. Two supermarkets sell the same washing powder.

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Supermarket A

2.4 kg

25% off

Normal price £8.80

Supermarket B

2.4 kg + 20% extra free

Normal price £8.80

Which supermarket gives the better value?

.....
(Total for Question 2 is 3 marks)

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3. Change 2.4 m² into cm².

.....
(Total for Question 3 is 1 mark)

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4. Emily leaves for the seaside at 09:20.

She drives 72 miles at an average speed of 48 mph.

At what time does Emily arrive at the seaside?

.....
(Total for Question 4 is 3 marks)

Density, Mass, Volume

5. The density of liquid A is 1.12 g/cm³.
The density of liquid B is 0.88 g/cm³.
75 litres of liquid A are mixed with 125 litres of liquid B.
Work out the density of the mixture.

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g/cm³

.....

(Total for Question 5 is 4 marks)

Force, Pressure, Area

6. A wooden crate exerts a force of 540 newtons on the floor.
The area of the base touching the floor is 3 m².
Work out the pressure on the floor.

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N/m²

.....

(Total for Question 6 is 2 marks)

7. A factory has 20 identical machines available.

It knows that 8 machines would take 35 hours to complete an order.

Show that the factory can complete the order in less than 15 hours.

(Total for Question 7 is 2 marks)

8. p is directly proportional to the square of q .

When $q = 3$, $p = 54$.

(a) Find an equation for p in terms of q .

.....

(2)

(b) Find the positive value of q when $p = 150$

.....

(1)

(Total for Question 8 is 3 marks)

Score:

I am confident with:

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I need to work on:

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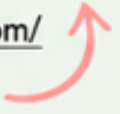
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Geometry: Knowledge Test 1



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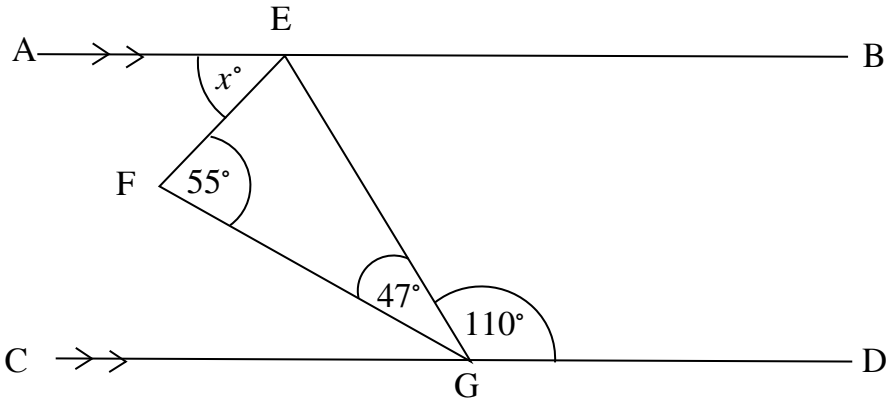
Angles in Parallel Lines

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1. AB and CD are parallel lines.



Work out the size of the angle AEF.

Give reasons for your answer.

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(Total for Question 1 is 4 marks)

Angles in Polygons

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2. Each exterior angle of a regular polygon is 24°.

Work out how many sides the polygon has.

.....

(Total for Question 2 is 2 marks)

Bearings

3. Leeds is on a bearing of 075° from Sheffield.

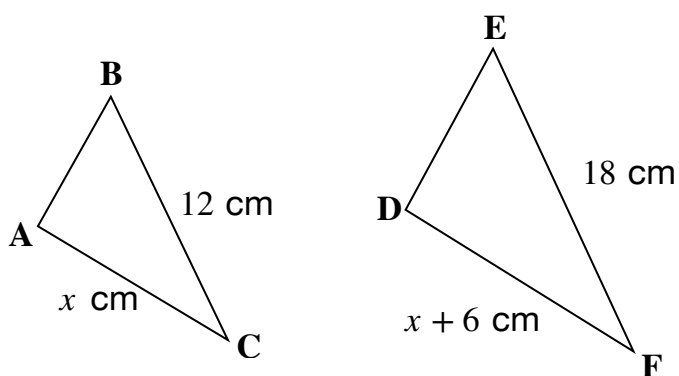


Find the bearing of Sheffield from Leeds.

.....
(Total for Question 3 is 2 marks)

Similar Triangles

4. Triangles ABC and DEF are mathematically similar.



$$AC = x \text{ cm}$$

$$BC = 12 \text{ cm}$$

$$DF = x + 6 \text{ cm}$$

$$EF = 18 \text{ cm}$$

Find the value of x .

.....
(Total for Question 4 is 4 marks)

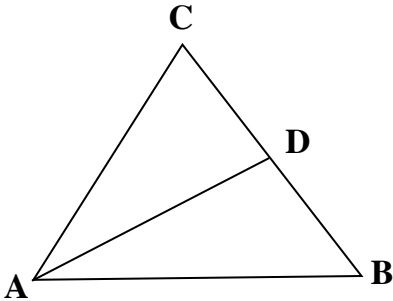
Congruent Triangles

5.

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Triangle ABC has line AD drawn to BC

$AB = AC$

AD bisects angle A

Prove that triangle ABD is congruent to triangle ACD.

(Total for Question 5 is 4 marks)

Similar Shapes (Area and Volume)

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6. Two similar cones have volumes in the ratio 125 : 216.
- The surface area of the smaller cone is 150 cm².
- Find the surface area of the larger cone.

.....

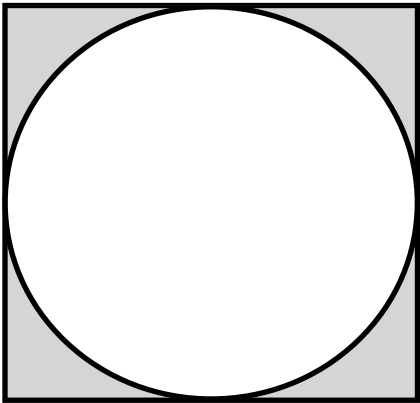
(Total for Question 6 is 3 marks)

7. A square has side length 14 cm.

Inside the square is a circle that touches all four sides of the square.

Work out the shaded area between the square and the circle.

Give your answer to 3 significant figures.



cm²

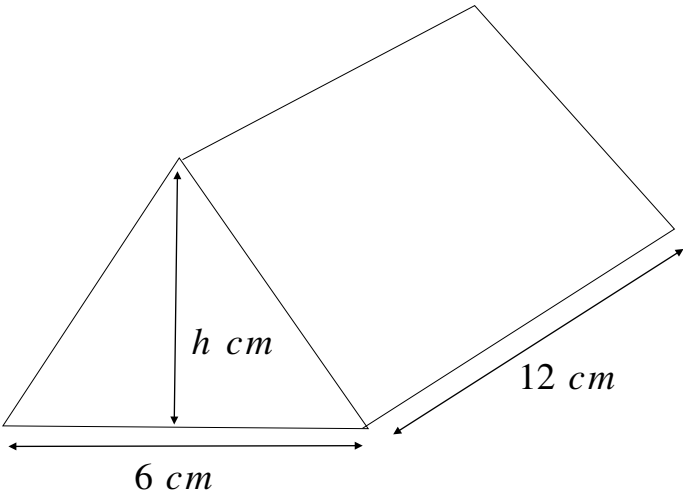
(Total for Question 7 is 3 marks)

8. A triangular prism has a volume of 180 cm³.

The length of the prism is 12 cm.

The base of the triangular cross-section is 6 cm.

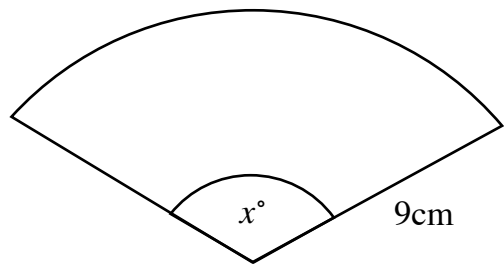
Work out the height of the triangular cross-section.



cm

(Total for Question 8 is 3 marks)

9. The diagram shows a sector of a circle with radius of 9 cm. The length of the arc is 6π cm.



Calculate the size of the angle marked x° .

o

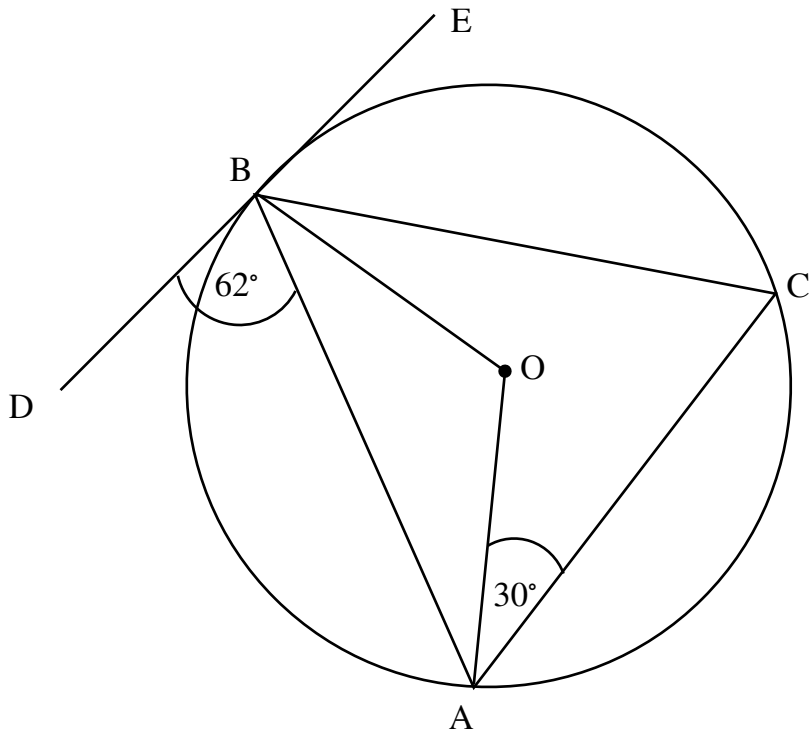
.....
(Total for Question 9 is 3 marks)

10. A cube has a volume of 125 cm^3 .
Work out the surface area of the cube.

cm²

.....
(Total for Question 10 is 3 marks)

11.



Points A, B and C lie on the circumference of a circle, centre O.

Angle DBA = 62°

Angle OAC = 30°

Find the size of the angle OBC.

You must show all your working.

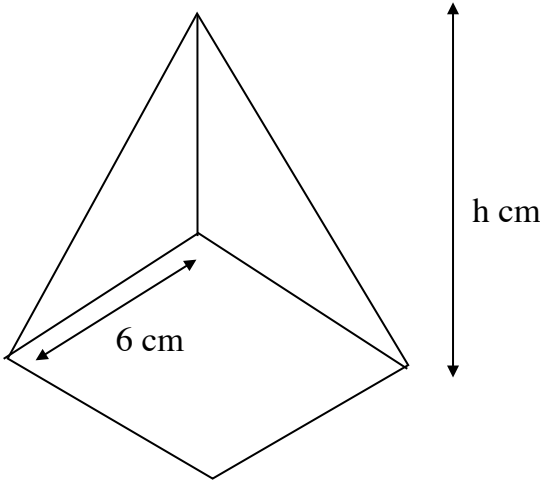
Volume of Cones and Pyramids

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12. A pyramid has a square base with side length 6 cm.
- The volume of the pyramid is 144 cm^3 .
- Find the vertical height of the pyramid.



.....cm

(Total for Question 12 is 3 marks)

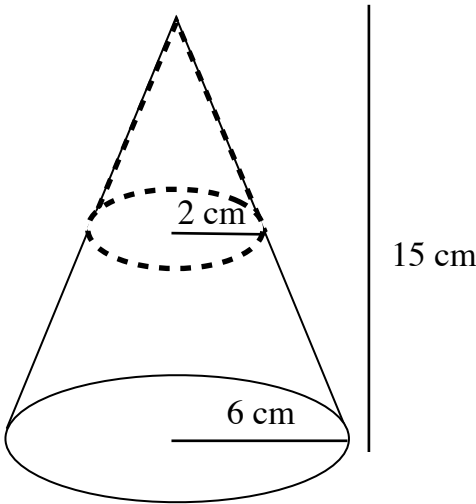
Frustums

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13. A frustum is formed by removing a small cone from a larger cone.
- The large cone has height 15 cm and radius 6 cm.
- The small cone removed has radius 2 cm.
- Find the height of the small cone.



.....cm

(Total for Question 13 is 2 marks)

Pythagoras' Theorem

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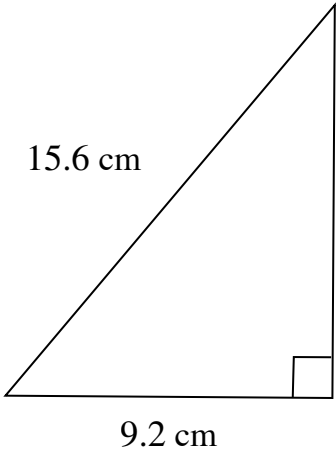
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14. A right-angled triangle has a hypotenuse of 15.6 cm and one other side of 9.2 cm.
- Calculate the missing side.
- Give your answer to 1 decimal place.



..... cm

(Total for Question 14 is 2 marks)

SOHCAHTOA

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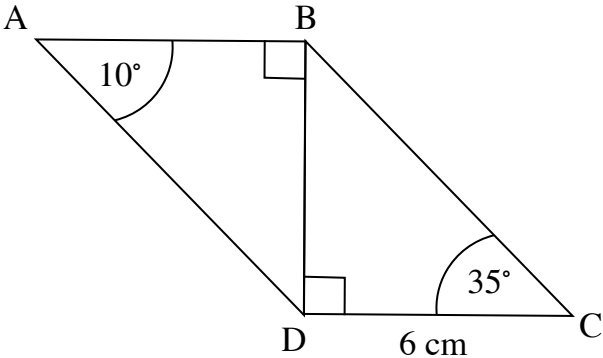
★★

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15. A shape is made from two right-angled triangles joined together.
- Find the length AD.
- Give your answer to 3 significant figures.



..... cm

(Total for Question 15 is 3 marks)

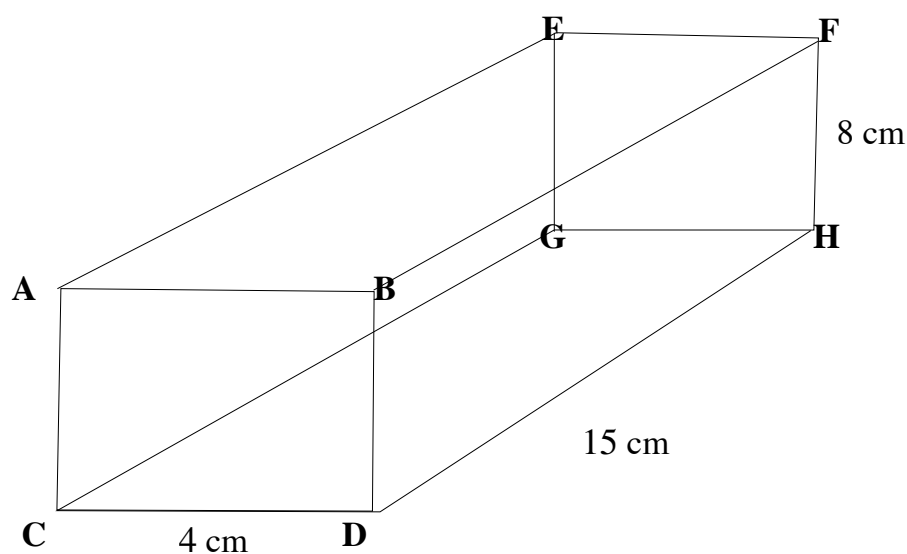
16. Write down the value of $\tan(60^\circ)$



.....
(Total for Question 16 is 1 mark)

3D Pythagoras and Trigonometry

17. ABCDEFGH is a cuboid



$$CD = 4 \text{ cm}$$

$$DH = 15 \text{ cm}$$

$$FH = 8 \text{ cm}$$

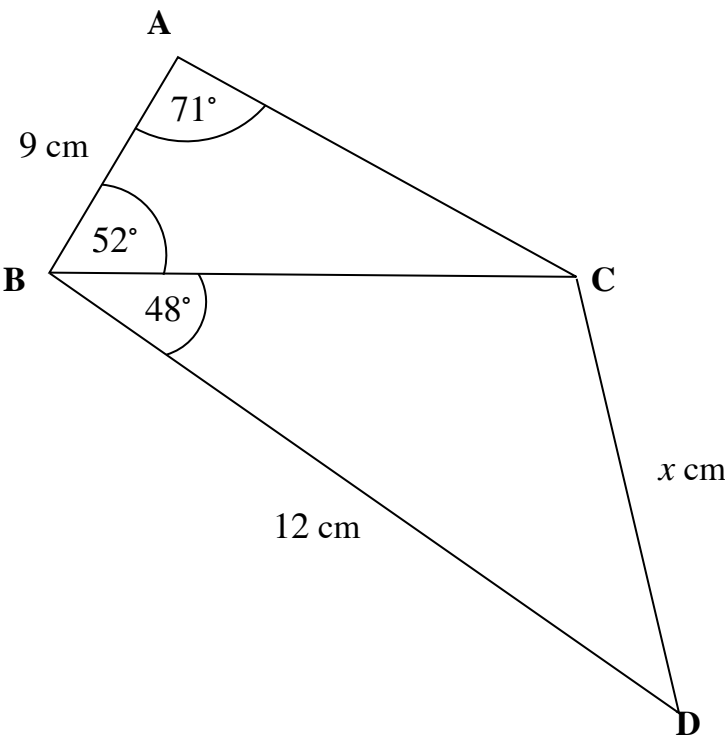
Find the angle between the diagonal CF and the base CDHG.

Give your answer correct to 3 significant figures.

.....
(Total for Question 17 is 4 marks)

18. In the below triangle, work out the size of CD.

Give your answer to 3 significant figures.

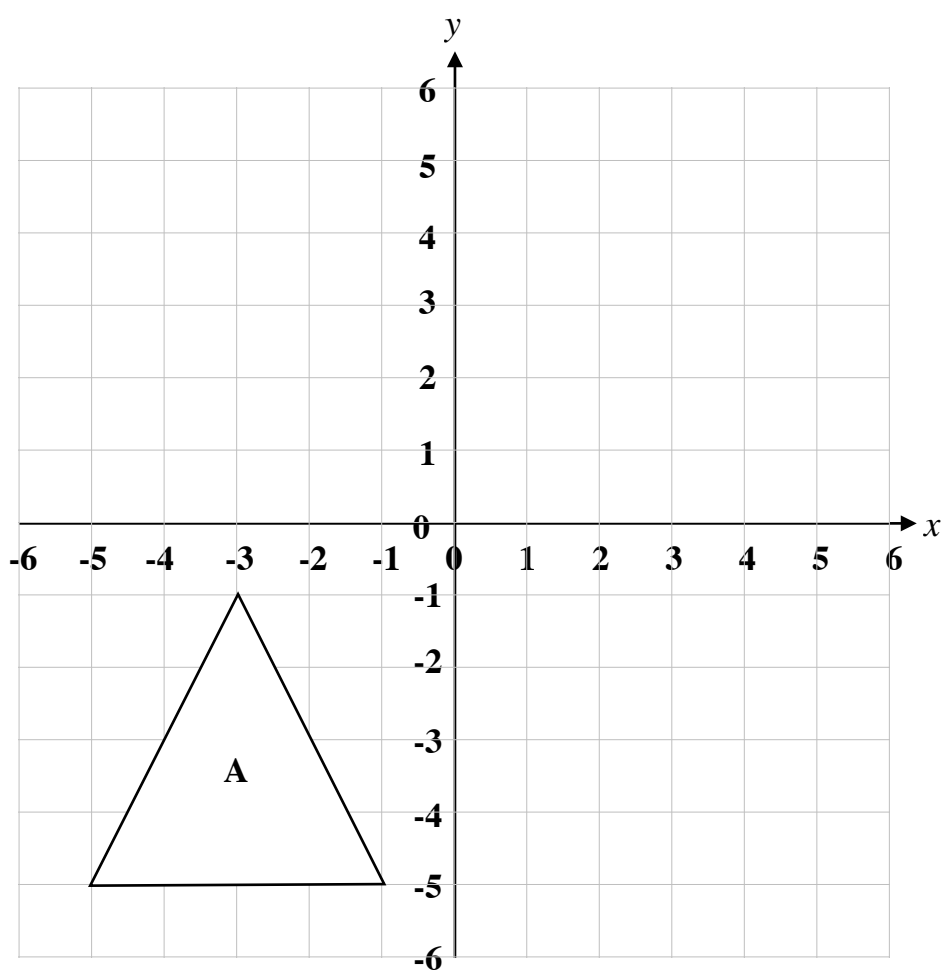


cm

.....
(Total for Question 18 is 4 marks)



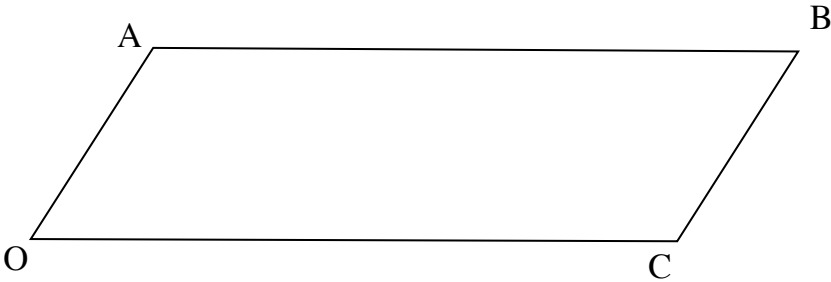
19. The diagram shows shape A.



Enlarge shape A by scale factor $-\frac{1}{2}$ with centre of enlargement $(-1, -3)$.

(Total for Question 19 is 3 marks)

20. OABC is a parallelogram.



$\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{AB} = 3\mathbf{b}$.

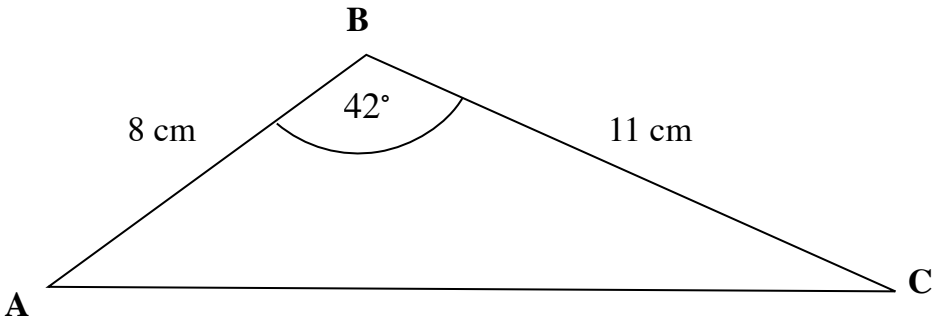
M is the midpoint of AB.

N is the point on BC such that BN : NC = 2 : 5.

Express $\overrightarrow{MN}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

.....
(Total for Question 20 is 4 marks)

21. Calculate the area of triangle ABC.



Give your answer correct to 3 significant figures.

.....

cm²

(Total for Question 21 is 2 marks)

Total for Test is 63 Marks

Score:

I am confident with:

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I need to work on:

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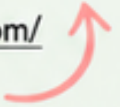
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HIGHER TIER

Probability: Knowledge Test 1



INSTRUCTIONS

- Use **black ink** or ball-point pen.
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- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



INFORMATION

- The marks for **each** question are shown in brackets– *use this as a guide as to how much time to spend on each question.*



ADVICE

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.



You've got this!

Relative Frequency

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1. A box contains pens that are blue, red, green and yellow.

The probabilities of picking each colour are shown in the table:

Colour	Blue	Red	Green	Yellow
Probability	0.3	0.25	0.1	

There are 7 yellow pens in the box.

Work out the total number of pens in the box.

.....
(Total for Question 1 is 4 marks)

Two-Way Tables

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2. At a gym, 180 members were asked which type of class they attend most often.

Each member is either a morning member or an evening member.

The class types are yoga, spin and weights

The results showed that:

- 95 members attend in the morning.
- 60 members attend yoga classes.
- 50 members attend spin classes.
- 20 morning members attend yoga.
- In the evening, twice as many members attend weights as attend spin.

How many evening members attend weights classes?

.....
(Total for Question 2 is 4 marks)

3. The probability that it rains today is 0.3. If it rains today, the probability that it rains tomorrow is 0.6. If it does not rain today, the probability that it rains tomorrow is 0.2.

a) Draw a probability tree diagram to represent this information.

(3)

b) Find the probability that it rains tomorrow

.....
(2)

(Total for Question 3 is 5 marks)

4. At a cinema, 70 people were asked which snacks they like out of popcorn (P), nachos (N) and sweets (S).

- 35 people like nachos
- 30 people like sweets
- 18 people like both popcorn and nachos
- 15 people like both popcorn and sweets
- 12 people like both nachos and sweets
- 5 people like all three snacks
- Everyone liked at least one of the snacks

How many people like exactly two snacks?

Capture Recapture

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5. A scientist is studying beetles.

80 beetles are caught, marked, and released.

Later, 100 beetles are caught and 25 are marked.

(a) Estimate the total number of beetles.

.....

(3)

(b) Give one assumption made.

.....

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(1)

(Total for Question 5 is 4 marks)

The Product Rule For Counting

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6. A club has 25 members.

Two members are going to be chosen at random to represent the club in a competition.

Work out the number of different pairs that can be chosen.

.....

(Total for Question 6 is 2 marks)

Score:

I am confident with:

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I need to work on:

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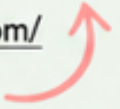
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HIGHER TIER

Statistics: Knowledge Test 1



INSTRUCTIONS

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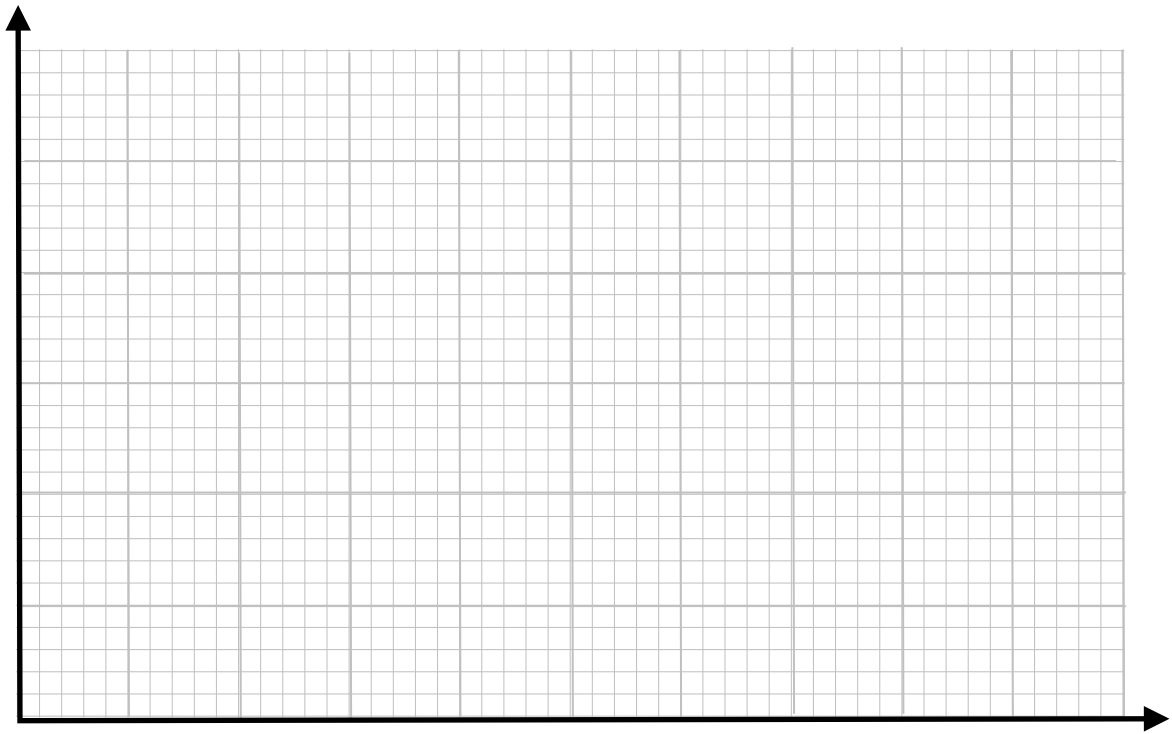


You've got this! ❤️

1. The table shows the ages of members of a sports club.

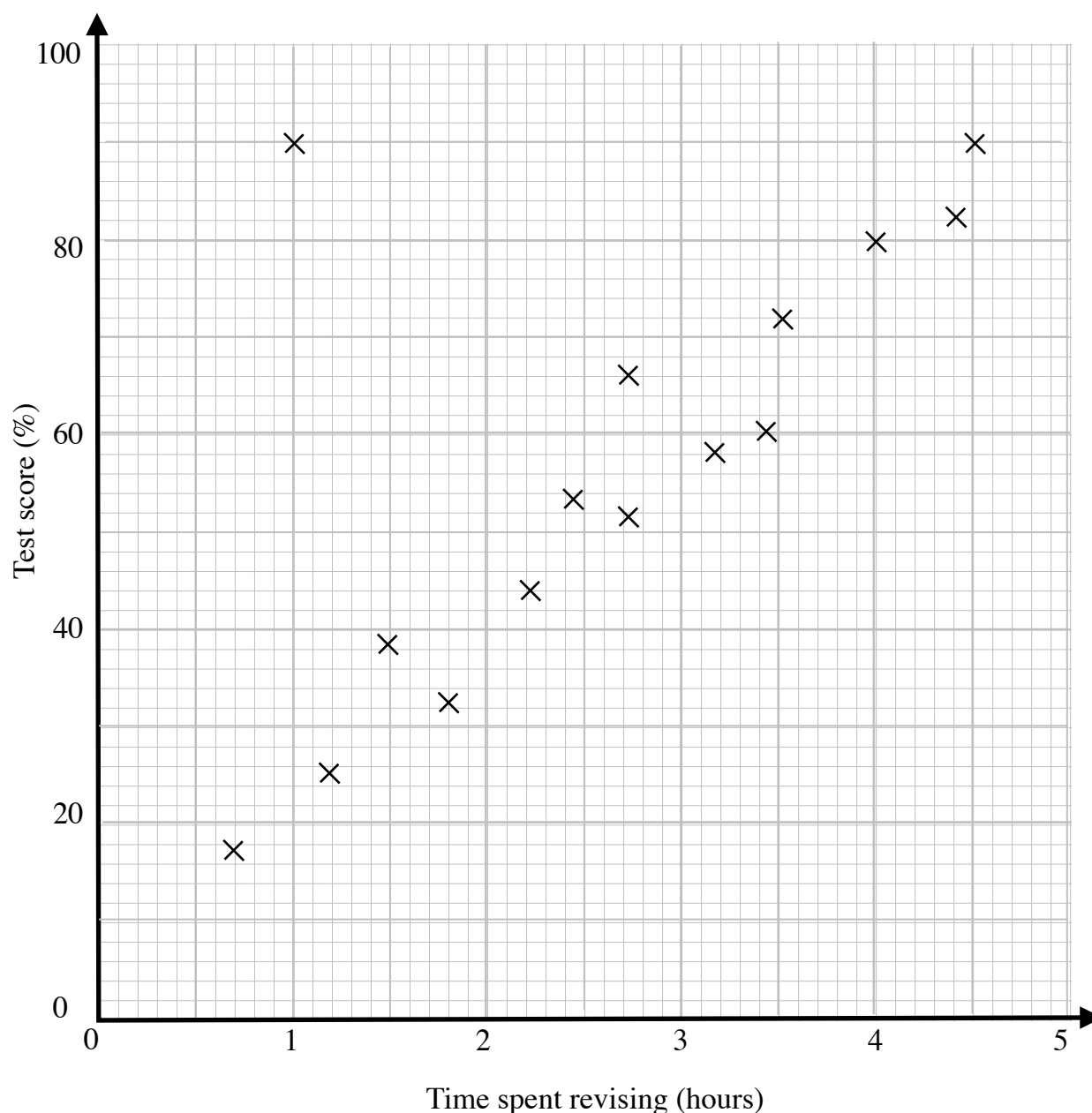
Age, a years	Frequency
$0 < a \leq 10$	4
$10 < a \leq 20$	8
$20 < a \leq 30$	12
$30 < a \leq 40$	10
$40 < a \leq 50$	6

Draw a frequency polygon for this data.



(Total for Question 1 is 3 marks)

2. The scatter graph shows the relationship between the number of hours spent revising and test score in a maths exam.



- (a) Describe the relationship between revision time and test score.

.....

.....

.....

(1)

- (b) Circle the outlier

(1)

A student spends 3 hours revising.
 (c) Use the graph to estimate their test score.

..... %
 (2)
 (Total for Question 2 is 4 marks)

Stem and Leaf Diagrams

3. The stem-and-leaf diagram shows the test scores of group A.

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4	5 8 9
5	2 2 3 5 7 8
6	0 2 3 4 6
7	2 5 8

Key:
 4 | 5 means 45

For group B:

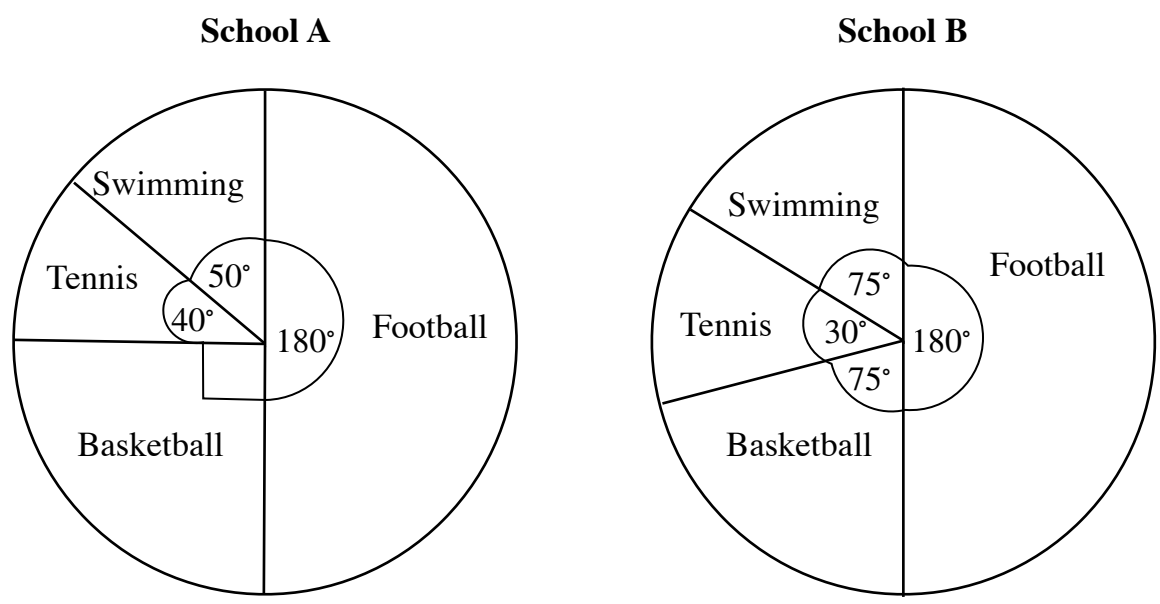
Median = 59
 Interquartile range = 12

Compare the distributions of the two groups.

.....

(Total for Question 3 is 4 marks)

4. The pie charts show the favourite sports of students in two schools.



James says:

“The same number of students like football in both schools because the football sectors are the same size.”

Is James correct? You must give reason for your answer.

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.....

5. The estimated mean mass of some students is 58 kg.

The below table is incomplete.

Mass (kg)	Frequency
$40 < m \leq 50$	8
$50 < m \leq 60$	15
$60 < m \leq 70$	x
$70 < m \leq 80$	3

Find the value of x .

.....
(3)

Explain why the calculated mean of 58 kg is only an estimate.

.....
.....
.....
(1)

(Total for Question 5 is 4 marks)

Quartiles and Interquartile Range

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6. A data set contains 5 numbers.

The median is 14.

The lower quartile is 9.

The upper quartile is 20.

Write down one possible data set.

.....
(Total for Question 6 is 2 marks)

Combined Means

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7. A group of students contains 15 boys and 10 girls.

The mean height of the whole group is 156 cm.

The mean height of the boys is 160 cm.

Find the mean height of the girls.

.....
(Total for Question 7 is 3 marks)

8. The table shows the masses of some parcels.

Mass, m kg	Frequency
$0 < m \leq 5$	12
$5 < m \leq 15$	30
$15 < m \leq 25$	26
$25 < m \leq 50$	40
$50 < m \leq 70$	16

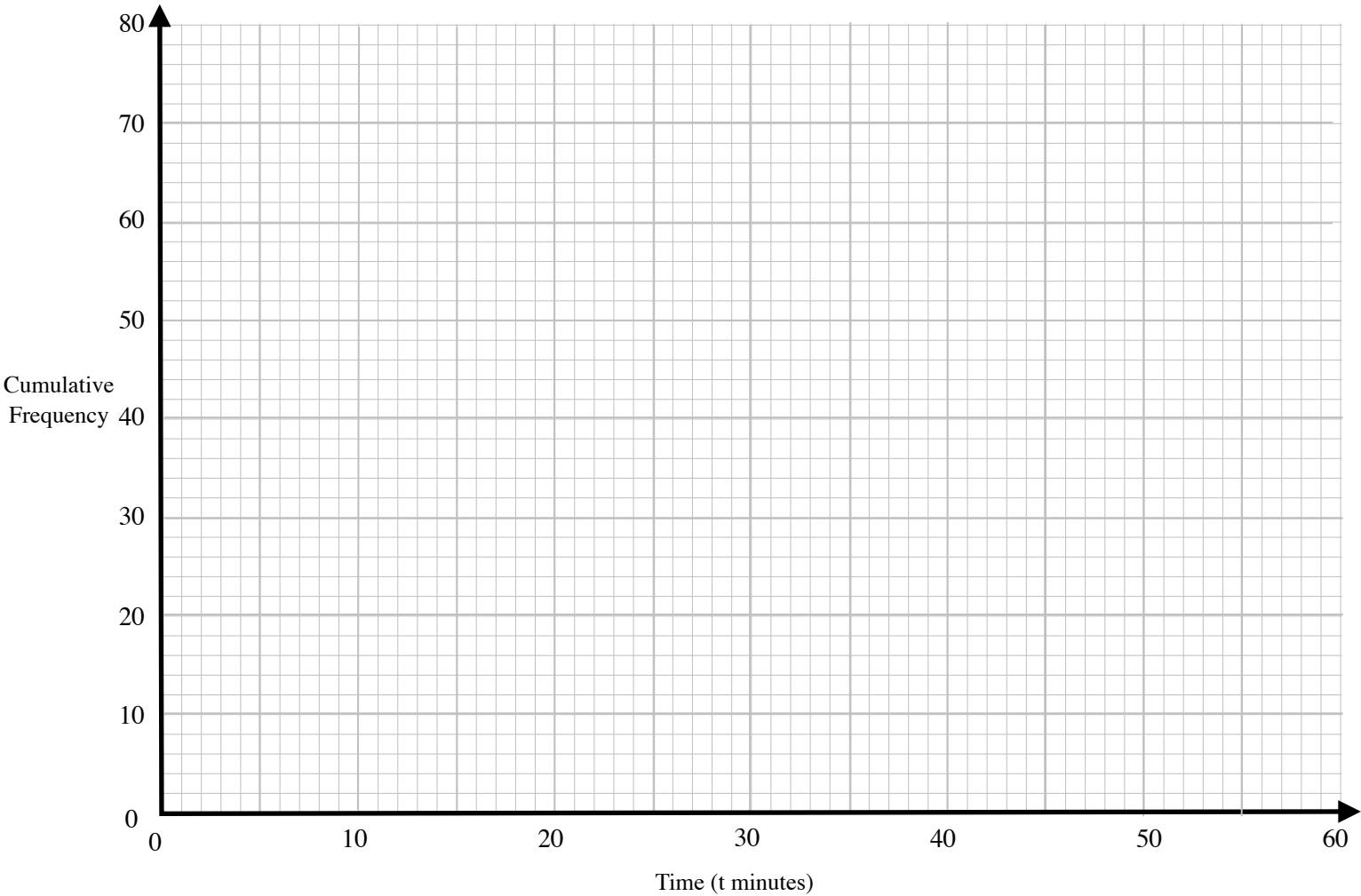
On the grid, draw a histogram to represent this information.



9. The table shows the time (in minutes) that customers spent shopping in a supermarket.

Time (t minutes)	Cumulative Frequency
$0 \leq t < 10$	8
$0 \leq t < 20$	22
$0 \leq t < 30$	41
$0 \leq t < 40$	57
$0 \leq t < 50$	68
$0 \leq t < 60$	75

(a) On the grid, draw a cumulative frequency graph to represent the data.



(2)

(b) Work out an estimate for the number of customers who spent less than 24 minutes in the supermarket.

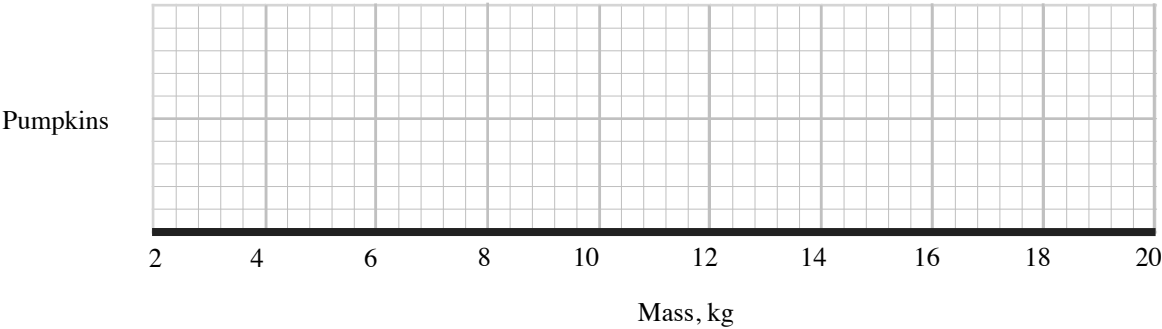
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(1)

(Total for Question 9 is 3 marks)

10. The table shows information about the masses of pumpkins grown by a farmer.

	Mass (Kg)
Minimum	4.5
Lower quartile	7.2
Median	8.8
Interquartile range	4.6
Maximum	14.3

(a) On the grid, draw a box plot to show the information on the table.



(3)

(b) Jake says “Half of the pumpkins are heavier than 8.8kg.”

Is Jake correct?

You must explain your answer.

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(2)

(Total for Question 10 is 5 marks)

Score:

I am confident with:

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I need to work on:

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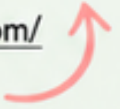
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HIGHER TIER

Graphs: Knowledge Test 1



INSTRUCTIONS

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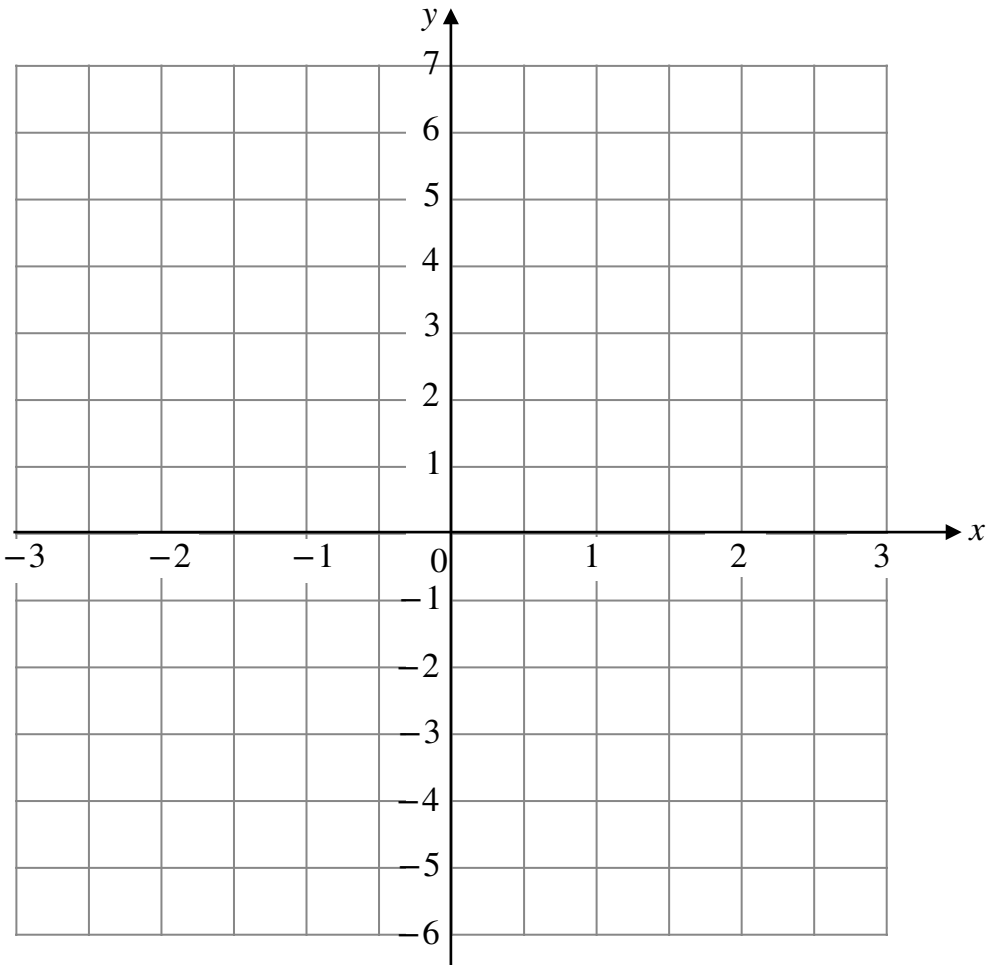
You've got this!

1. (a) Complete the table of values for $y = 2x + 1$.

x	-3	-2	-1	0	1	2	3
y		-3			3		7

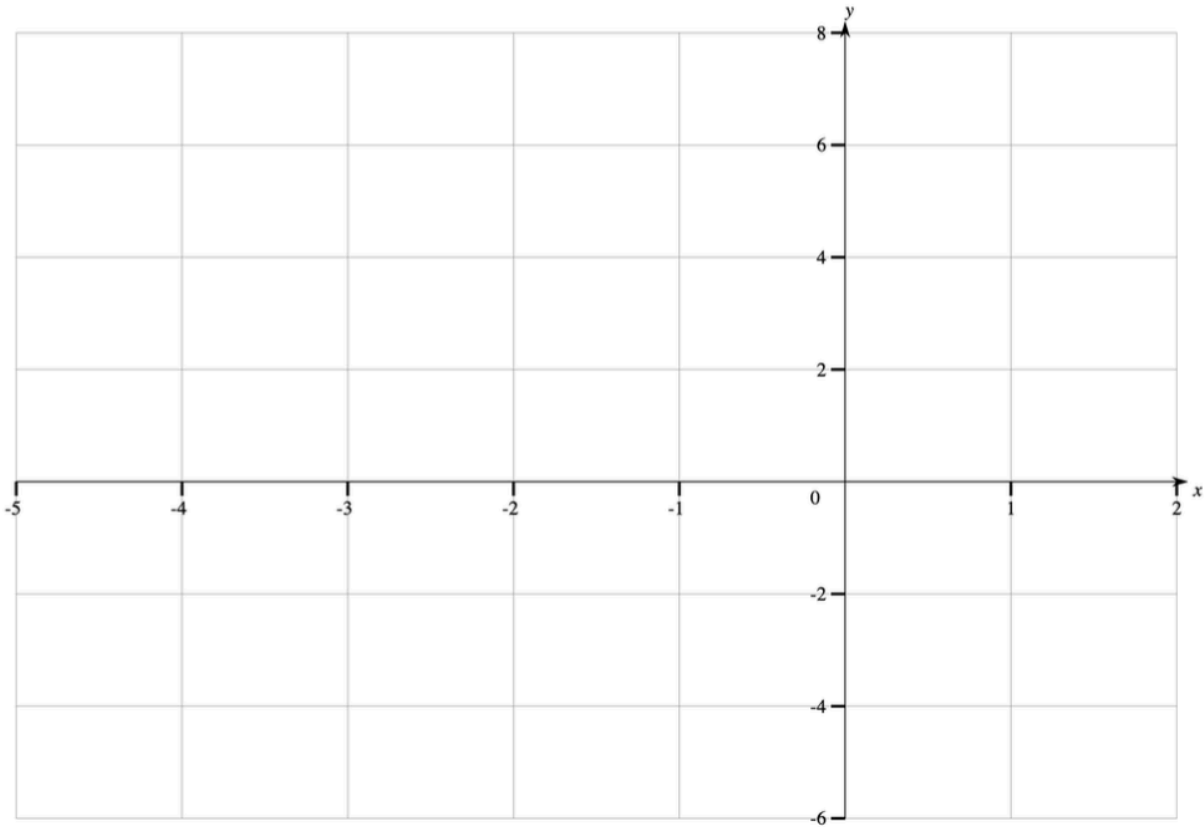
(2)

(b) On the grid, draw the graph of $y = 2x + 1$ for values of x from -3 to 3



(2)

2. (a) Sketch the graph of $y = -x^2 - 3x + 4$ for $x = -5$ to $x = 2$.



(3)

(b) Estimate the turning point of the graph $y = -x^2 - 3x + 4$

..... (1)

(c) Using the graph, write down the roots of $-x^2 - 3x + 4 = 0$

..... (1)

(d) Using the graph, write down the roots of $-x^2 - 3x + 4 = 2$

..... (1)

★

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3. The midpoint of the line joining $(-7, a)$ and $(5, 11)$ is $(-1, 6)$.
Find the value of a .

.....
(Total for Question 3 is 2 marks)

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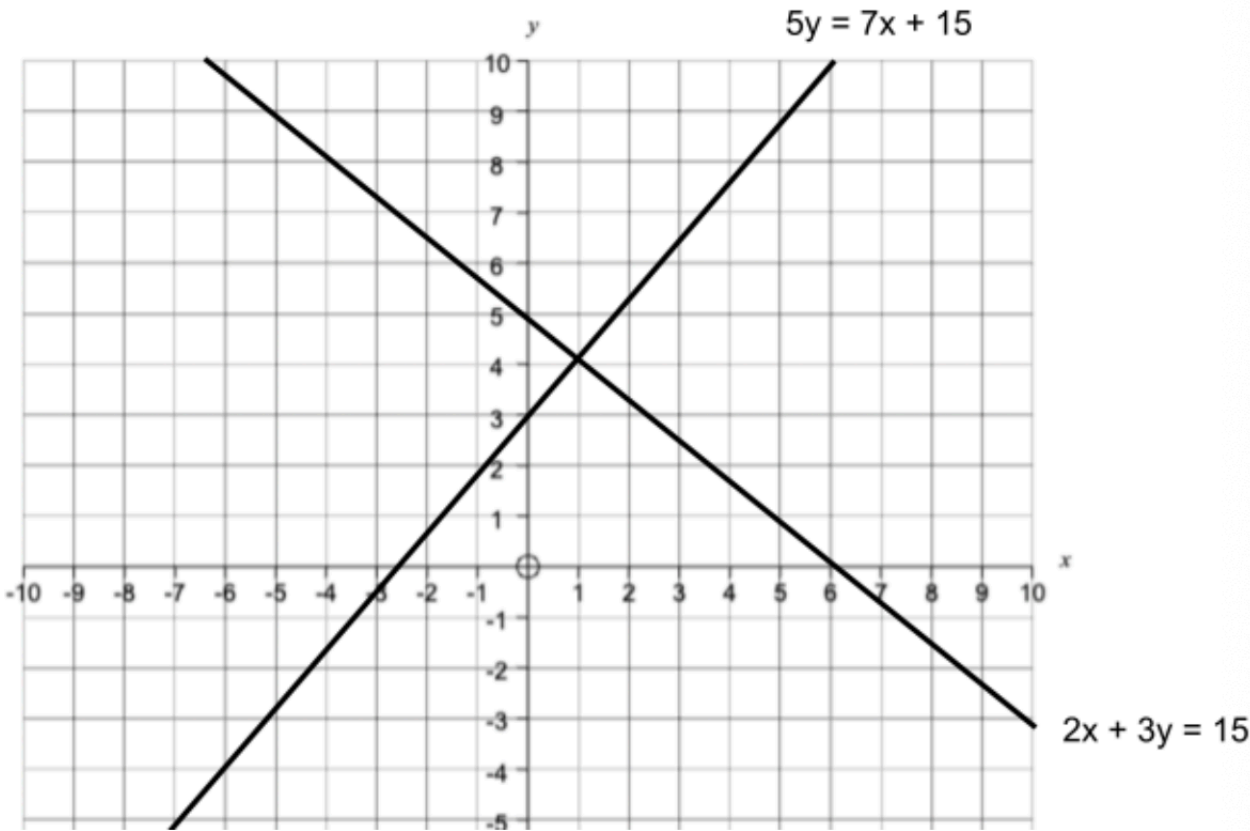
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4. Find the equation of the line passing through the points $(-2, 3)$ and $(4, 6)$.

.....
(Total for Question 4 is 3 marks)

5. Below are the graphs of

$5y = 7x + 15$
 $2x + 3y = 15$



Use the graphs to solve the simultaneous equations

$5y = 7x + 15$
 $2x + 3y = 15$

$x = \dots\dots\dots$
 $y = \dots\dots\dots$

(Total for Question 5 is 2 marks)

Parallel and Perpendicular Lines

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6. The equation of line M is $y = -2x + 4$.

Find the equation of the line that is perpendicular to M and passes through (2, 4).

.....
(Total for Question 6 is 3 marks)

Trigonometric Graphs

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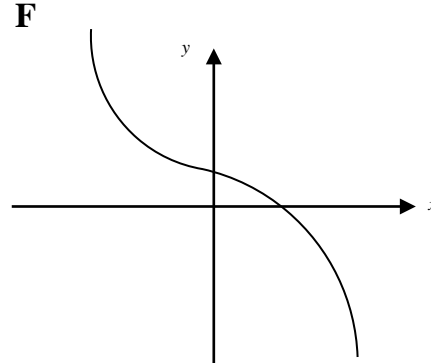
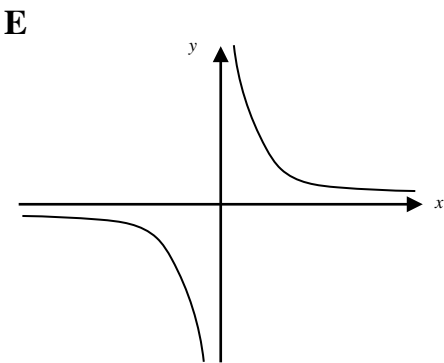
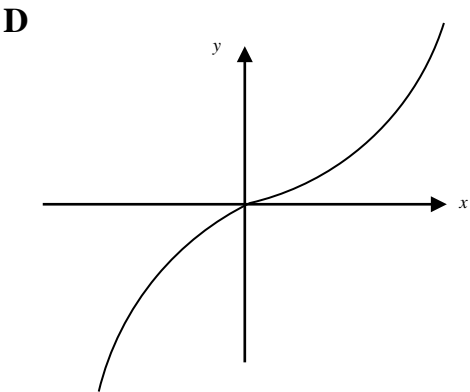
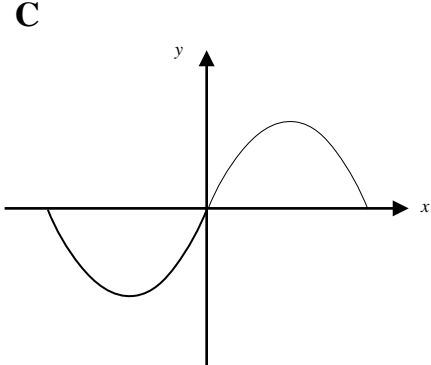
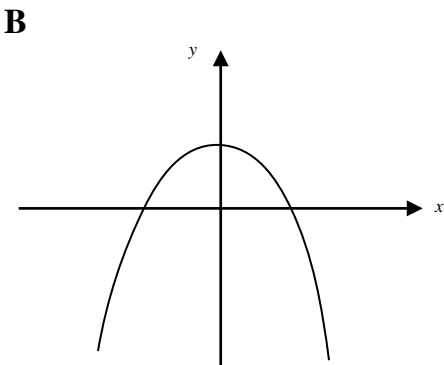
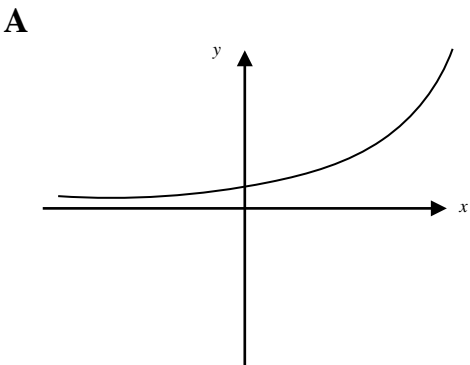
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7. Sketch the graph of $y = \sin(x)$ for $0 \leq x \leq 360$.



(Total for Question 7 is 2 marks)

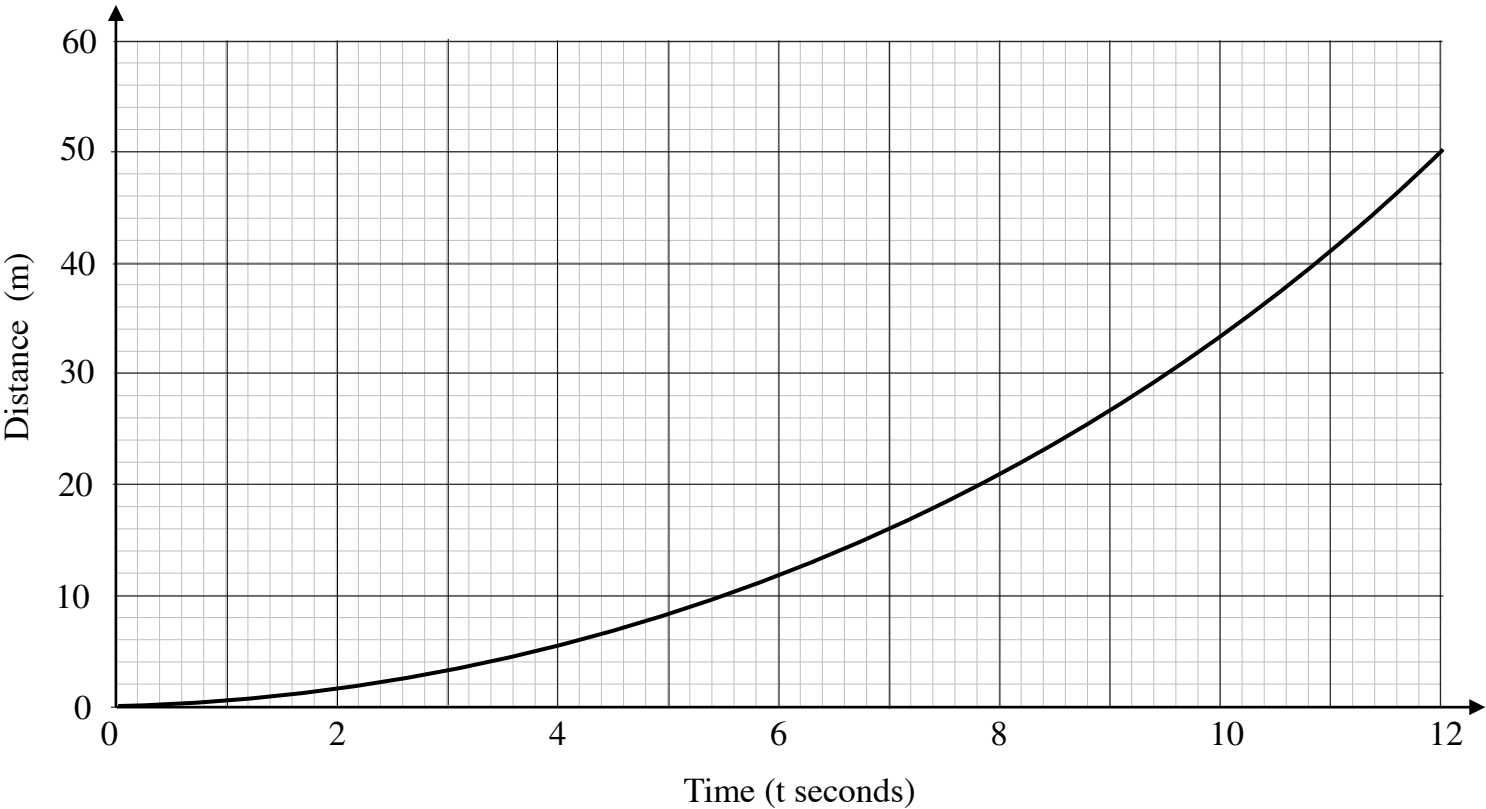
8. The diagram shows six graphs.



In the table below, match each equation to the letter of its graph.

Equation	Graph
$y = -x^2 + 4$	
$y = -x^3 + 2$	
$y = 6^x$	
$y = \frac{3}{x}$	

9. Here is a distance time graph.



(a) Estimate the gradient at time 3 seconds.

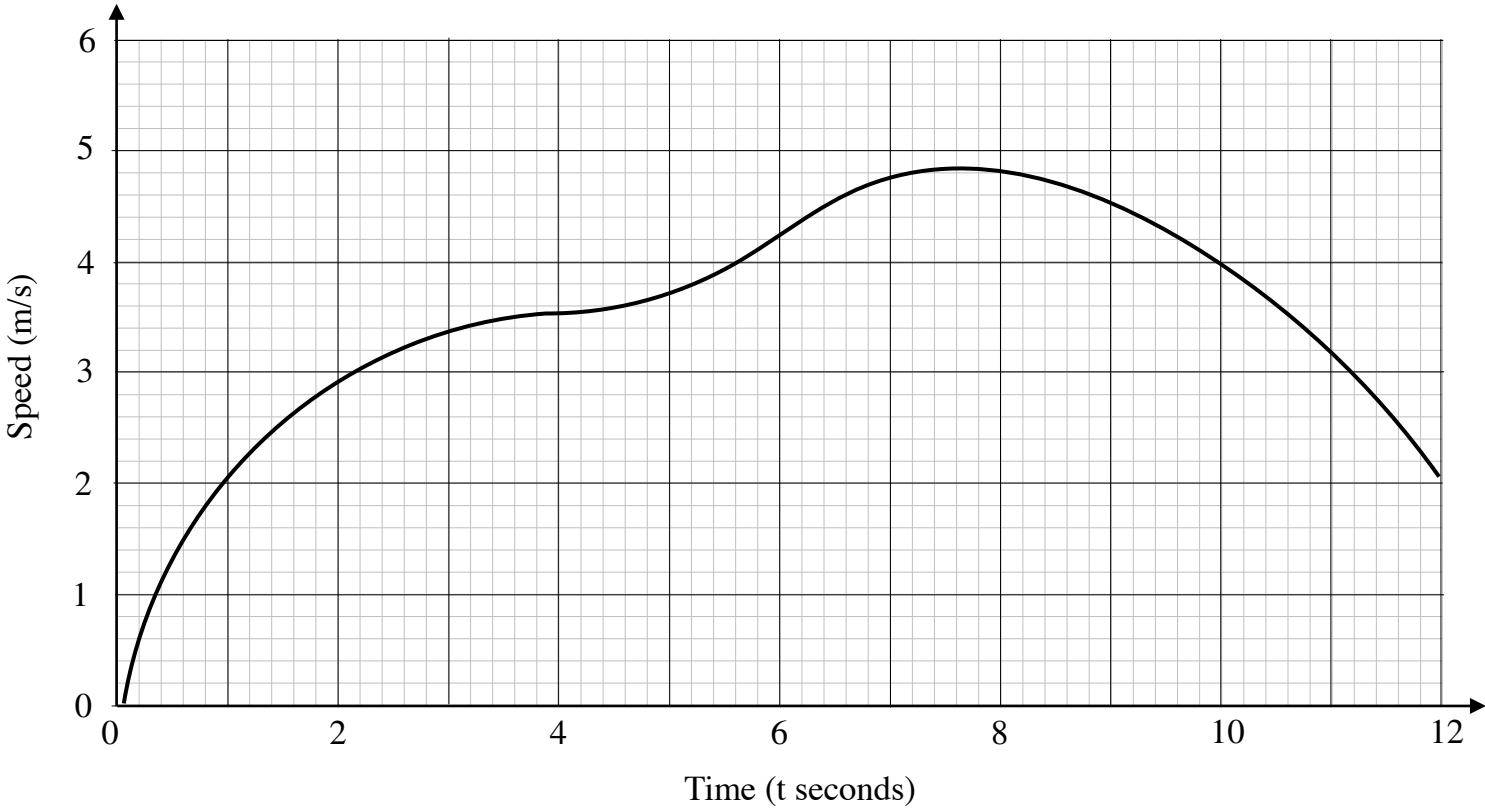
.....
(3)

(b) What does the gradient represent?

.....
.....
(1)

(Total for Question 9 is 4 marks)

10. Here is a speed time graph.



(a) Work out an estimate for the gradient of the graph at time $t = 2$.

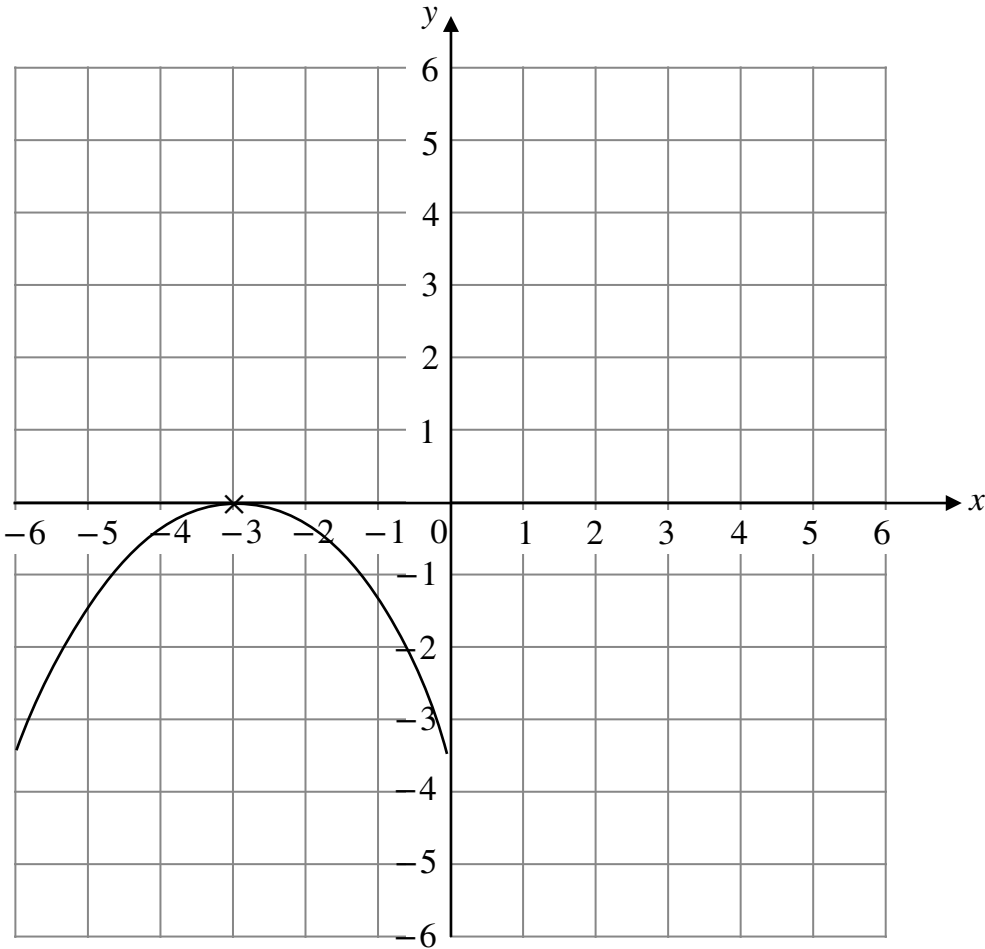
.....
(3)

(b) What does this gradient represent?

.....
.....
(1)

(Total for Question 10 is 4 marks)

11. Here is the graph of $y = f(x)$



Write down the coordinates of the maximum point of the curve with equation

(a) $y = 2f(x) + 6$

.....

(b) $y = 3f(x - 9)$

(2)

.....

(c) $y = f(x + 1) - 2$

(2)

.....

(2)

(Total for Question 11 is 6 marks)

Score:

I am confident with:

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I need to work on:

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