MATHS GENIE REVISION BOOKLET

Grade 5

Name:……..……

Class/Teacher:……..……

All answers can be found on Maths Genie website, in GCSE revision section:

www.mathsgenie.co.uk

5.1	Writing a Ratio as a Fraction or Linear Function
5.2	Direct and Inverse Proportion
5.3	Reverse Percentages
5.4	Standard Form
5.5	Speed and Density
5.6	Changing the Subject of a Formula
5.7	Expanding and Factorising Quadratics
5.8	Solving Quadratics
5.9	Drawing Quadratic Graphs
5.10	Drawing Other Graphs: Cubic/Reciprocal
5.11	Simultaneous Equations
5.12	Solving Simultaneous Equations Graphically
5.13	Midpoint of a Line Segment
5.14	Gradient of a Line
5.15	Equation of a Line
5.16	Spheres and Cones
5.17	Sector Areas and Arc Lengths
5.18	Similar Shapes (Lengths)
5.19	SOHCAHTOA (Trigonometry)
5.20	Exact trig values
5.21	Vectors
5.22	Probability Trees
5.23	Venn Diagrams

Click on the links below for the taught videos to help you with the topics in this booklet

5.1 Ratio & Fractions and Ratio Problems
https://www.mathsgenie.co.uk/ratio-fraction-or-linear-function.php

5.2 Direct & Inverse Proportion
https://www.mathsgenie.co.uk/proportion.php

5.3 Reverse Percentages
https://www.mathsgenie.co.uk/reverse-percentages.php

5.4 Standard Form
https://www.mathsgenie.co.uk/standard-form.php

5.5 Speed and Density
https://www.mathsgenie.co.uk/speed-and-density.php

5.6 Changing the Subject of a Formula
https://www.mathsgenie.co.uk/changing-the-subject1.php

5.7 Expanding and Factorising Quadratics
https://www.mathsgenie.co.uk/expanding-and-factorising-quadratics.php

5.8 Solving Quadratics
https://www.mathsgenie.co.uk/solving-quadratics.php

5.9 Drawing Quadratic Graphs
https://www.mathsgenie.co.uk/quadratic-graphs.php

5.10 Drawing Other Graphs: Cubic and Reciprocal
https://www.mathsgenie.co.uk/cubic-reciprocal.php

5.11 Simultaneous Equations

https://www.mathsgenie.co.uk/simultaneous.php

5.12 Solving Simultaneous Equations Graphically
https://www.mathsgenie.co.uk/simultaneous-graphically.php

5.14 Gradient of a Line
https://www.mathsgenie.co.uk/gradient-of-a-line.php

5.15 Equation of a Line
https://www.mathsgenie.co.uk/equation-of-a-line.php

5.16 Spheres and Cones
https://www.mathsgenie.co.uk/spheresandcones.php

5.17 Sector Areas and Arc Lengths
https://www.mathsgenie.co.uk/sectors-and-arcs.php

5.18 Similar Shapes (Lengths)
https://www.mathsgenie.co.uk/similar-shapes-length.php

5.19 SOHCAHTOA (Trigonometry)
https://www.mathsgenie.co.uk/sohcahtoa.php

5.20 Exact Trig Values
https://www.mathsgenie.co.uk/exact-trig-values.php

5.21 Vectors
https://www.mathsgenie.co.uk/column-vectors.php

5.22 Probability Trees
https://www.mathsgenie.co.uk/probability-trees.php

5.23 Venn Diagrams
https://www.mathsgenie.co.uk/venn-diagrams.php

Remember to show your teacher the work that you've completed and to ask in lessons for any help with these topics.

1 In a bag there are blue sweets and red sweets. The ratio of blue sweets to red sweets is 5:3
What fraction of the sweets are blue?

(2 marks)

2 In a bag there are blue sweets and red sweets. The ratio of blue sweets to red sweets is 2:7
What fraction of the sweets are red?

(2 marks)

3 In a bag there are blue sweets and red sweets. The ratio of blue sweets to red sweets is 4:9
What fraction of the sweets are blue?

(2 marks)

4 In a bag there are blue sweets, red sweets and green sweets.
The ratio of blue sweets to red sweets to green sweets is 5:3:2
What fraction of the sweets are green?

(2 marks)

5 In a bag there are blue sweets, red sweets and green sweets.
The ratio of blue sweets to red sweets to green sweets is 2:4:5
What fraction of the sweets are red?

(2 marks)

6 In a bag there are blue sweets, red sweets and green sweets.
The ratio of blue sweets to red sweets to green sweets is 6:9:4
What fraction of the sweets are blue?

(2 marks)

7 In a bag there are only red sweets and yellow sweets. $\frac{2}{3}$ of the sweets are red.
Write down the ratio of red sweets to yellow sweets?

(2 marks)

8 In a bag there are only red sweets and yellow sweets. $\frac{3}{5}$ of the sweets are red
Write down the ratio of red sweets to yellow sweets?

(2 marks)

9 In a bag there are only blue sweets and green sweets. $\frac{5}{6}$ of the sweets are green.
Write down the ratio of blue sweets to green sweets?

(2 marks)

10 An artist is making orange paint by mixing red paint (x ml) and yellow paint (y ml) in the ratio 8:11

(a) Use this information to draw a graph showing the relationship between the amount of red paint and the amount of yellow paint used.

(2)

(b) The artist decides to use 50ml of yellow paint. Use your graph to work out how much red paint he should use.

(2)

(4 marks)

11 A baker makes bread using the ratio of flour (y cups) to water (x cups) of 5:3.

(a) Use this information to draw a graph showing the relationship between the amount of flour and the amount water used to make bread.

(2)

(b) The baker is going to use 30 cups of flour. Use your graph to work out how much water the baker should use.

(2)

(4 marks)

12 In a cinema the ratio of adults to children is 3:1
The ratio of boys to girls is 3:2
What fraction of all the people in the cinema are girls?

(3 marks)

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13 On a school trip the ratio of staff to students is 1:10
All of the students are from either year 7 or year 8. The ratio of year 7 students to year 8 students is 3:2
What fraction of all the people on the trip are year 7 students?

(4 marks)

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14 In a theatre the ratio of adults to children is 7:3
The ratio of boys to girls is 3:2
What percentage of all the people in the cinema are girls?

(3 marks)

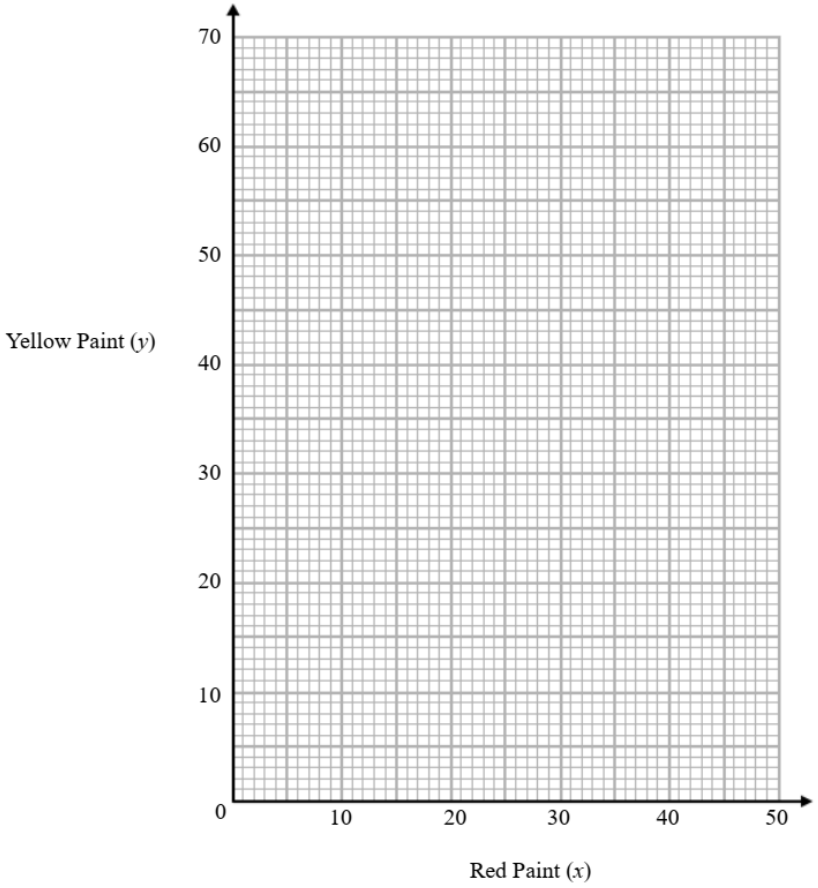
---

15 In a company the ratio of men to women is 2:3
30% of the women are under the age of 30.
What fraction of all the people in the company are women under the age of 30?

(3 marks)

10 An artist is making orange paint by mixing red paint (x ml) and yellow paint (y ml) in the ratio 8:11

(a) Use this information to draw a graph showing the relationship between the amount of red paint and the amount of yellow paint used.

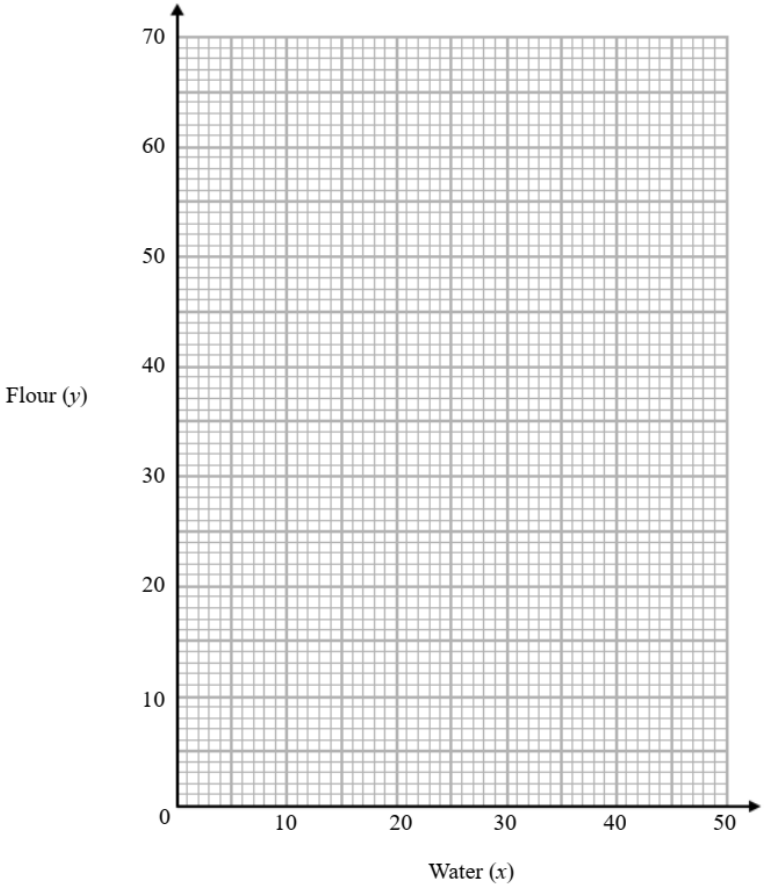


(2)

(b) The artist decides to use 50ml of yellow paint. Use your graph to work out how much red paint he should use.

11 An baker makes bread using the ratio of flour (y cups) to water (x cups) of 5:3.

(a) Use this information to draw a graph showing the relationship between the amount of flour and the amount water used to make bread.



(2)

(b) The baker is going to use 30 cups of flour. Use your graph to work out how much water the baker should use.

Workings Out Page

1 The ratio of dogs to cats is 5:3
The ratio of fish to dogs is 6:1

Find the ratio of cats to fish.
Give your answer in its simplest form.

(2 marks)

2 Given that $a:b = 4:5$ and $b:c = 3:2$

Find the ratio $a:b:c$
Give your answer in its simplest form.

(2 marks)

3 Alfie, Bertie and Charlie share £66.
The amount Alfie and Bertie get is in the ratio 9:5
The amount Bertie and Charlie get is in the ratio 2:1

How much does Alfie get?

(3 marks)

4 Dylan, Eli and Fabian share some sweets.
The amount of sweets Dylan gets to the amount of sweets Eli gets is in the ratio 7:3
The amount Dylan gets to the amount Fabian gets is in the ratio 4:5

Given Fabian gets 21 more sweets than Dylan.

Work out how many sweets Eli gets.

(3 marks)

5 Given that $a:b = 3:7$ and $a:c = 4:3$

Find the ratio $a:b:c$
Give your answer in its simplest form.

(2 marks)

6 Given that $a:c = 1:6$ and $b:c = 2:5$

Find the ratio $a:b:c$
Give your answer in its simplest form.

(2 marks)

7 There are red sweets, blue sweets and green sweets in a bag.
The ratio of red sweets to sweets that are not red is 2:3
The ratio of green sweets to sweets that are not green is 6:19

Work out the ratio of red sweets to blue sweets to green sweets.

(3 marks)

8 A football team plays some games in a season. Each game was a win, a draw or a loss.

The ratio of the games they won to the games they did not win was 9:7
The ratio of games they lost to games they did not lose was 1:7.

Given the team played less than 50 games, work out the highest amount of games they could have won.

(2 marks)

9 The points A, B, C and D lie in order on a straight line.

$AB:BD = 2:5$ and $AC:CD = 4:7$

Find $AB:BC:CD$

(3 marks)

10 The points A, B, C and D lie in order on a straight line.

$AB:BD = 3:5$ and $AC:CD = 5:6$

Find $AB:BC:CD$

(3 marks)

11 Andy and Bruce share some sweets in the ratio 9:4.
Andy gets A sweets
Bruce gets B sweets

Carla and David share the same amount of sweets as Andy and Bruce.
They share their sweets in the ratio 5:2.

Carla gets C sweets
David gets D sweets

Find $A:B:C:D$

(3 marks)

12 A and B are in the ratio 5:1
C and D are in the ratio 2:3

Given: $A + B = 2(C + D)$

Find $A:B:C:D$

(3 marks)

13 Glen and Harper share some money in the ratio 5:2.
Glen gets £G
Harper gets £H

India and Jade share the same amount of money as Glen and Harper.
They share their money in the ratio 4:7.

India gets £I
Jade gets £J

Find $G:H:I:J$

(3 marks)

14 A and B are in the ratio 4:3
C and D are in the ratio 1:5

Given: $3(A + B) = C + D$

Find $A:B:C:D$

(3 marks)

Workings Out Page

Workings Out Page

1 A machine fills 1000 bottles in 5 hours.

Work out how many hours it would take the machine to fill 1200 bottles.

(2 marks)

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2 It costs £0.75 to buy 5 bananas.

Work out how much it would cost to buy 7 bananas.

(2 marks)

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3 3 tins of beans and 4 tins of tomatoes costs £2.73.

5 tins of beans costs £1.55.

Work out how much one tin of tomatoes costs.

(2 marks)

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4 There are 500 sheets in a pack of paper. 500 sheets of paper weigh 2.5kg.

Work out the weight of 50 sheets of paper.

(2 marks)

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5 It takes 2 painters 4 days to complete a job.

Work out how many days it would take 1 painter to complete the same job.

(2 marks)

6 It takes 3 machines 2 days to produce a batch of products

Work out how long it would take 1 machine to produce the same batch of products.

(2 marks)

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7 It takes 3 painters 6 days to complete a job.

Work out how many days it would take 2 painters to complete the same job.

(2 marks)

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8 It takes 5 machines 6 hours to produce 1000 DVDs

Work out how long it would take 4 machines to produce 1000 DVDs.

(2 marks)

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9 x is inversely proportional to y.

x is given by the formula: $x = \frac{1000}{y}$

Find the value of x when $y = 50$

(2 marks)

---

10 y is directly proportional to x.

y is given by the formula: $y = 0.4x$

Find the value of y when $x = 6$

(2 marks)

11 The weight of a piece of wire (w grams) is directly proportional to its length (l cm).

w is given by the formula: $w = 30l$

Find the length of a wire weighing 75 grams.

(2 marks)

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12 The force, F, between two magnets is inversely proportional to the square of the distance, x cm, between them.

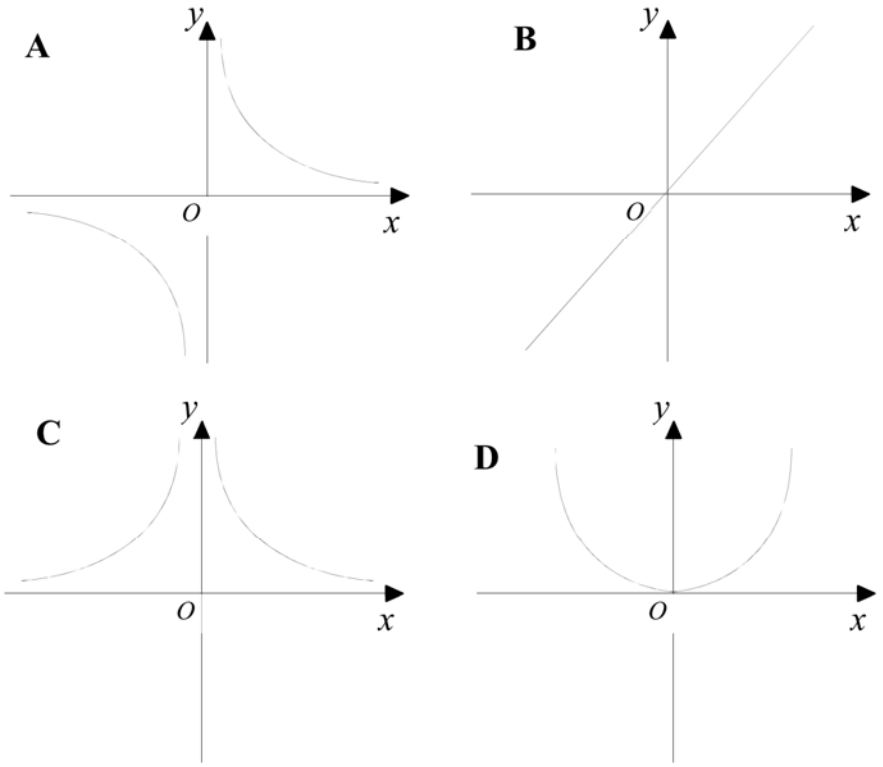
F is given by the formula:

$$F = \frac{36}{x^2}$$

Find the Force when two magnets are 3 cm apart.

(2 marks)

13 Here are four graphs.



Sketch each graph and match with a statement in the table below.

Proportionality relationship	Graph letter
y is directly proportional to x	
y is inversely proportional to x	
y is directly proportional to x^2	
y is inversely proportional to x^2	

(2 marks)

Workings Out Page

Workings Out Page

1 The value of a house increased by 6%.
The house then had a value of £265 000

Work out the value of the house before the increase.

(2 marks)

2 In a sale, the normal price of a book is reduced by 20%.
The sale price of the book is £4.80

Work out the normal price of the book.

(2 marks)

3 The value of a litre of petrol increased by 8%.
A litre of petrol then cost £1.62

Work out the price of a litre of petrol before the increase.

(2 marks)

4 In a sale, normal prices are reduced by 25%.
The normal price of a coat is reduced by £12

Work out the normal price of the coat.

(2 marks)

5 In a sale, the normal price of a TV is reduced by 20%.
The sale price of the TV is £660

Work out the normal price of the TV.

(2 marks)

6 The cost of a council tax bill increased by 5%.
The council tax bill increased by £62.

Work out the cost of the council tax bill before the increase.

(2 marks)

7 The price of a train season ticket increased by 4%.
The price of the ticket increased by £152.20

Work out the price of the train ticket before the increase.

(2 marks)

8 In a sale, the normal price of a car is reduced by 30%.
The sale price of the car is £6300

Work out the normal price of the car.

(2 marks)

9 In a sale, normal prices are reduced by 15%.
The normal price of a pen is reduced by £1.20

Work out the normal price of the pen.

(2 marks)

Workings Out Page

1 (a) Write 1.2×10^5 as an ordinary number. (1)

(b) Write 0.003 in standard form. (1)

(2 marks)

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2 (a) Write 42 900 000 in standard form. (1)

(b) Write 3.61×10^{-3} as an ordinary number. (1)

(2 marks)

---

3 (a) Write 9.516×10^6 as an ordinary number. (1)

(b) Write 0.0724 in standard form. (1)

(c) Calculate $(8.694 \times 10^2) \div (6.21 \times 10^{-3})$
Give your answer in standard form. (2)

(4 marks)

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4 (a) Write 5.12×10^{-5} as an ordinary number. (1)

(b) Write 5 600 000 in standard form. (1)

(2 marks)

---

5 (a) Write 0.0065 in standard form. (1)

(b) Write 3×10^4 as an ordinary number. (1)

(2 marks)

---

6 (a) Write 3.08×10^{-5} as an ordinary number. (1)

(b) Write 5 million in standard form. (1)

(c) Calculate $(6.3 \times 10^5) \times (2.5 \times 10^{-2})$
Give your answer in standard form. (2)

(4 marks)

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7 Work out $(8.69 \times 10^{-5}) \div (5.5 \times 10^{-7})$
Give your answer in standard form.

(2 marks)

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8 (a) Write 0.00931 in standard form. (1)

(b) Write 7.429×10^3 as an ordinary number. (1)

(2 marks)

---

9 (a) Write 5.2×10^{-1} as an ordinary number. (1)

(b) Work out the value of $(3.2 \times 10^3) \times (6.5 \times 10^4)$
Give your answer in standard form. (2)

(3 marks)

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10 Write 0.21×10^6 in standard form.

(1 mark)

---

11 Work out $(6.7 \times 10^4) \times (3.4 \times 10^{-8})$
Give your answer as an ordinary number.

(2 marks)

---

12 Work out $\dfrac{0.03 \times 0.02}{0.008}$

Give your answer in standard form.

(3 marks)

---

13 Work out $\dfrac{3.744 \times 10^9}{2.4 \times 10^5}$

Give your answer in standard form.

(2 marks)

---

14 Work out the value of $(5 \times 10^3) \times (6 \times 10^7)$
Give your answer in standard form.

(2 marks)

15 (a) Write 0.000 054 376 in standard form. (1)

(b) Write 4.15×10^6 as an ordinary number. (1)

(c) Work out $\dfrac{4.1 \times 10^5 \times 7.3 \times 10^4}{2 \times 10^{-6}}$ (2)

(4 marks)

16 Write these numbers in order of size.
Start with the smallest number.

6.1×10^2 0.061×10^2 6100×10^{-4} 61

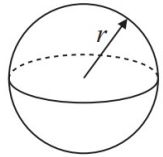
(2 marks)

17 A sphere has a radius of 6.4×10^6 metres.
Calculate the volume of this sphere.

Give your answer in standard form to 1 decimal place.

Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



(3 marks)

18 A large rock has a weight of 1.2×10^4 grams.

Find, in standard form, the weight of 12 of these large rocks.

(2 marks)

19 Write these numbers in order of size.
Start with the smallest number.

3.5×10^2 0.035×10^5 350×10^{-2} 35×10^0

(2 marks)

20 The diameter of Neptune is 5.0×10^4 km
The diameter of Mars is 6.8×10^3 km
Calculate the difference between the diameter of Neptune and the diameter of Mars.
Give your answer in standard form.

(2 marks)

21 One electron has a mass of 9.1×10^{-31} grams.

Find the mass of 250 of electrons.

(2 marks)

22 The area of Australia is 7.7×10^6 km^2
The area of Cyprus is 9.3×10^3 km^2
How many times larger is Australia than Cyprus.
Give your answer to the nearest whole number.

(2 marks)

23 The area of the Pacific Ocean is 3.61×10^8 km^2
The area of the Atlantic Ocean is 8.51×10^7 km^2
Find the total area of the Pacific Ocean and the Atlantic Ocean.
Give your answer in standard form.

(2 marks)

24 The distance between Earth and Mars is 78 million kilometres.
The speed of light is 3×10^5 km/s

Calculate the time, in seconds, it takes for light to travel from Earth to Mars.
Give your answer in standard form.

(2 marks)

Workings Out Page

Workings Out Page

1 A sprinter runs a distance of 200 metres in 25 seconds.
Work out the average speed of the sprinter.

(Total for question 1 is 1 mark)

2 A block exerts a force of 120 Newtons on the ground.
The block has an area of 2 m^2.

Work out the pressure on the ground.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

(Total for question 2 is 1 mark)

3 A piece of gold has a mass of 760 grams and a volume of 40 cm^3.
Work out the density of the piece of gold.

(Total for question 3 is 1 mark)

4 A rock has a mass of 56 grams and a density of 3.5 grams/cm^3.
Work out the volume of the rock.

(Total for question 4 is 1 mark)

5 A car travels a distance of 230 miles in 4 hours and 15 minutes.
Work out the average speed of the car, in miles per hour.
Give your answer to 1 decimal place.

(Total for question 5 is 2 marks)

6 A block exerts a force of 84 Newtons on a table.
The pressure on the table is 30 N/m^2.

Work out the area of the box that is in contact with the table.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

(Total for question 6 is 2 marks)

7 A liquid has a density of 1.3 grams per ml.
Find the mass of 250 ml of the liquid.

(Total for question 7 is 1 mark)

8 Dani leaves her house at 08 00.
She drives 63 miles to work.
She drives at an average speed of 27 miles per hour.
At what time does Dani arrive at work?

(Total for question 8 is 2 marks)

9 Anthony travels from Newcastle to Manchester at an average speed of 65 miles per hour.
The journey takes him 2 hours and 15 minutes.

Declan makes the same journey in 2 hours and 35 minutes.

(a) Work out Declan's average speed for the journey. (4)

(b) If Declan took different roads than Anthony, how could this affect your answer to part (a)? (1)

(Total for question 9 is 5 marks)

10 Rachel drives 300 miles from London to Newcastle.
She drives the first 165 miles at an average speed of 60 mph.
From this point it takes Rachel 3 hours and 15 minutes to complete her journey.

What was Rachel's average speed for the whole journey?

(Total for question 10 is 4 marks)

11 Andrew ran 3.1 miles in 14 minutes and 35 seconds.

He assumes he can run 8 miles at the same speed.

(a) Work out how long it would take Andrew to run 8 miles. (4)

Give your answer in minutes and seconds to the nearest second.

Andrew's speed actually decreases the further he goes.

(b) How does this affect your answer to part (a)? (1)

(Total for question 11 is 5 marks)

12 Liquid **A** has a density of 1.2 g/cm^3

150 cm^3 of Liquid **A** is mixed with some of Liquid **B** to make Liquid **C**.

Liquid **C** has a mass of 210 g and a density of 1.12 g/cm^3

Find the density of Liquid **B**.

(Total for question 12 is 3 marks)

13 100ml of liquid A and 200ml of liquid B are mixed together to make liquid C.

Liquid A has a density of 0.7g/ml.
Liquid B has a density of 1.1 g/ml.

Work the density of liquid C.

(Total for question 13 is 4 marks)

Workings Out Page

Workings Out Page

1 $f = 5c - 8$

Make c the subject of the formula. **(2 marks)**

2 $u = 4t - 21$

Make t the subject of the formula. **(2 marks)**

3 $x = 3y - 2$

Make y the subject of the formula. **(2 marks)**

4 $m = 5n + 2p$

Make p the subject of the formula. **(2 marks)**

5 $a = 3c - 2$

Make c the subject of the formula. **(2 marks)**

6 $P = 3a + 3b$

Make a the subject of the formula. **(2 marks)**

7 Make n the subject of $m = n^2 + 3$ **(2 marks)**

8 Make a the subject of $v = u + at$ **(2 marks)**

9 Make a the subject of $v^2 = u^2 + 2as$ **(2 marks)**

10 Make b the subject of $a = \sqrt{\frac{b+2}{5}}$ **(3 marks)**

11 Make b the subject of $A = 3b + 9$ **(2 marks)**

12 Make x the subject of $y = 3x - 2$ **(2 marks)**

13 Make x the subject of $y = \frac{1}{2}x + 6$ **(2 marks)**

14 Make x the subject of $y = \frac{2}{5}x - 12$ **(2 marks)**

15 Make x the subject of $5x + 6y + 12 = 0$ **(2 marks)**

16 Make x the subject of $y = x^3 - 5$ **(2 marks)**

17 Make x the subject of $y = \frac{2x + 3}{4}$ **(2 marks)**

18 Make a the subject of $x = 3(a + 9)$ **(2 marks)**

19 $a = \frac{3 + c}{b}$

Make b the subject of the formula. **(2 marks)**

20 $d = \sqrt{\frac{3h}{2}}$

Make h the subject of the formula. **(3 marks)**

Workings Out Page

Workings Out Page

1 Expand and simplify $(x + 7)(x - 3)$

(2 marks)

2 (a) Expand and simplify $(2p - 3)(p - 5)$ **(2)**

(b) Factorise $a^2 + 15a + 36$ **(2)**

(4 marks)

3 (a) Expand and simplify $(x + 3)(x - 3)$ **(2)**

(b) Factorise $x^2 - 8x + 7$ **(2)**

(4 marks)

4 Expand and simplify $(m + 3)(m + 4)$

(2 marks)

5 (a) Expand and simplify $(2x + 3)(3x - 1)$ **(2)**

(b) Factorise $x^2 + 10x + 25$ **(1)**

(3 marks)

6 (a) Expand and simplify $(4y + 3)(2y - 3)$ **(2)**

(b) Factorise $x^2 + 7x + 6$ **(2)**

(4 marks)

7 Expand and simplify $(x - 2)(x - 9)$

(2 marks)

8 (a) Expand and simplify $(5h + 2)(h + 4)$ **(2)**

(b) Factorise $x^2 - 49$ **(1)**

(3 marks)

9 (a) Expand and simplify $(3x - 5)(2x - 3)$ **(2)**

(b) Factorise $n^2 - 3n - 18$ **(2)**

(4 marks)

10 Expand and simplify $(x + 6)(3x + 8)$

(2 marks)

11 (a) Expand and simplify $(x - 6)(x - 7)$ **(2)**

(b) Factorise $x^2 - 16$ **(1)**

(3 marks)

12 (a) Expand and simplify $(2x + 1)(5x - 9)$ **(2)**

(b) Factorise $x^2 - 13x + 36$ **(2)**

(4 marks)

13 Expand and simplify $(a - 7)^2$

(2 marks)

14 (a) Expand and simplify $(2x - 1)(x + 4)$ **(2)**

(b) Factorise $x^2 - 100$ **(1)**

(3 marks)

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15 (a) Expand and simplify $(3d - 2)(d + 7)$ **(2)**

(b) Factorise $x^2 - 3x - 40$ **(2)**

(4 marks)

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16 Factorise $n^2 + 3n - 28$

(2 marks)

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17 (a) Expand and simplify $(a - 5)(a + 6)$ **(2)**

(b) Factorise $b^2 - 81$ **(1)**

(3 marks)

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18 (a) Expand and simplify $(2x + 5)(x + 9)$ **(2)**

(b) Factorise $y^2 - 7y + 12$ **(2)**

(4 marks)

---

19 Factorise $m^2 - m - 30$

(2 marks)

---

20 (a) Expand and simplify $(5a - 1)(2a - 7)$ **(2)**

(b) Factorise $b^2 - 144$ **(1)**

(4 marks)

---

21 (a) Expand and simplify $(7x + 1)(x + 5)$ **(2)**

(b) Factorise $y^2 + 13y + 30$ **(2)**

(4 marks)

Workings Out Page

Workings Out Page

1 (a) Factorise $a^2 + 3a - 28$ **(2)**

(b) Solve $a^2 + 3a - 28 = 0$ **(1)**

(3 marks)

---

2 (a) Factorise $x^2 - 7x + 10$ **(2)**

(b) Solve $x^2 - 7x + 10 = 0$ **(1)**

(3 marks)

---

3 (a) Factorise $b^2 + 9b + 20$ **(2)**

(b) Solve $b^2 + 9b + 20 = 0$ **(1)**

(3 marks)

---

4 (a) Factorise $x^2 - 3x - 18$ **(2)**

(b) Solve $x^2 - 3x - 18 = 0$ **(1)**

(3 marks)

---

5 (a) Factorise $y^2 - 10y + 9$ **(2)**

(b) Solve $y^2 - 10y + 9 = 0$ **(1)**

(3 marks)

---

6 (a) Factorise $a^2 - a - 56$ **(2)**

(b) Solve $a^2 - a - 56 = 0$ **(1)**

(3 marks)

---

7 Solve $x^2 + 14x + 24 = 0$

(3 marks)

---

8 Solve $x^2 + 5x - 6 = 0$

(3 marks)

---

9 Solve $x^2 + 5x + 6 = 0$

(3 marks)

---

10 Solve $x^2 - 12x + 32 = 0$

(3 marks)

---

11 Solve $x^2 + 19x + 90 = 0$

(3 marks)

---

12 Solve $x^2 + 11x - 42 = 0$

(3 marks)

---

13 Solve $a^2 - 10a + 16 = 0$

(3 marks)

---

14 Solve $y^2 - 2y - 35 = 0$

(3 marks)

---

15 Solve $x^2 + 3x - 54 = 0$

(3 marks)

---

16 Solve $b^2 - 10b - 24 = 0$

(3 marks)

---

17 Solve $m^2 + 13m + 40 = 0$

(3 marks)

---

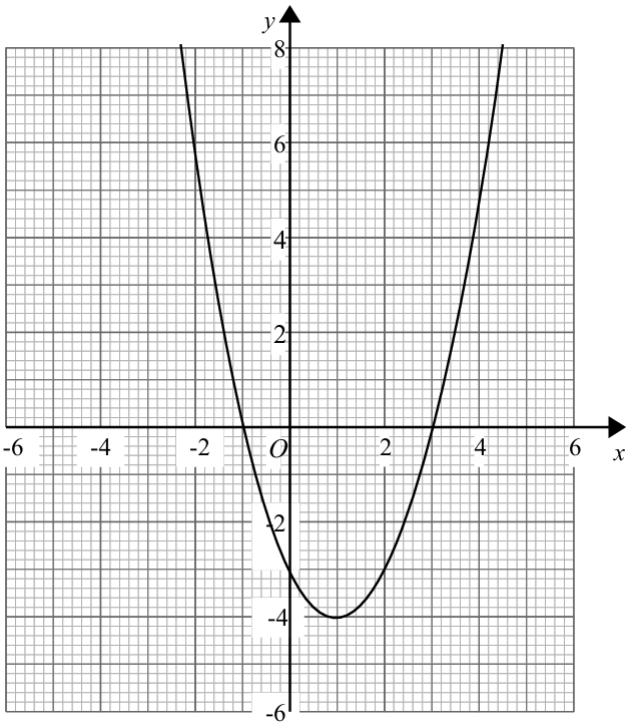
18 Solve $x^2 + 10x - 24 = 0$

(3 marks)

Workings Out Page

Workings Out Page

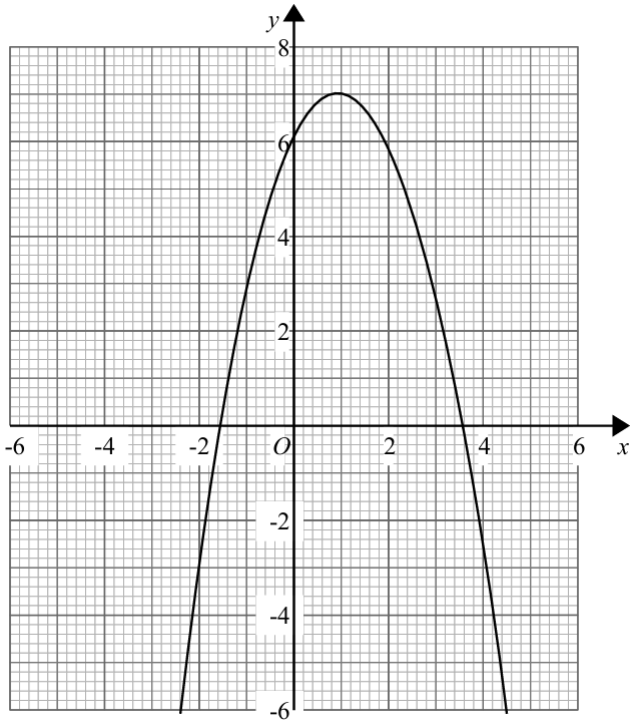
1 Here is the graph of $y = x^2 - 2x - 3$



(a) Write down the turning point of the graph

(b) Use the graph to find the roots of the equation $x^2 - 2x - 3 = 0$

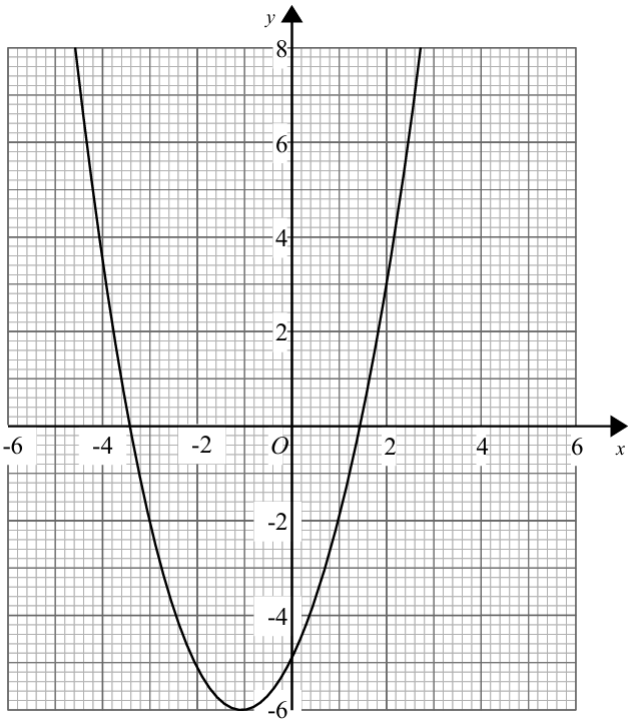
2 Here is the graph of $y = 2x + 6 - x^2$



(a) Write down the turning point of the graph $y = 2x + 6 - x^2$

(b) Use the graph to find the roots of the equation $x^2 = 2x + 6$

3 Here is the graph of $y = x^2 + 2x - 5$

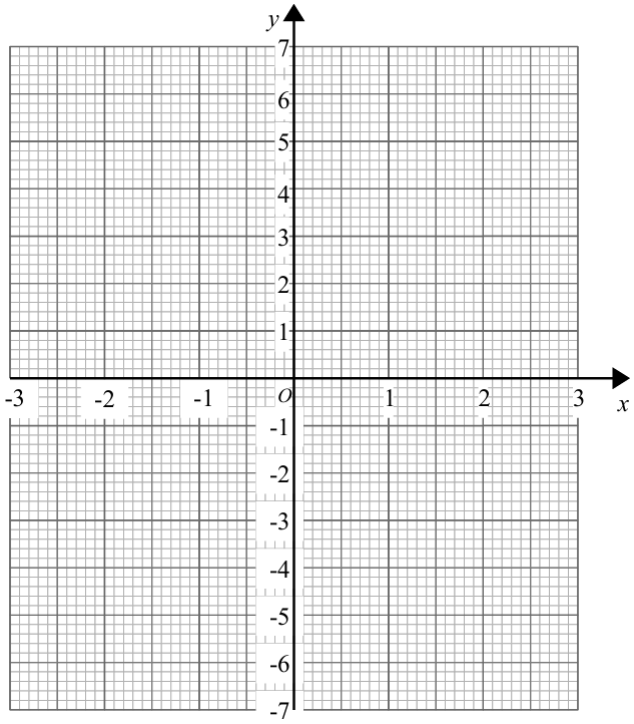


(a) Write down the turning point of the graph $y = x^2 + 2x - 5$

(b) Use the graph to find the roots of the equation $x^2 + 2x - 5 = 2$

4 Complete the table of values for $y = x^2 + x - 6$

x	-3	-2	-1	0	1	2	3
y				-6		0	

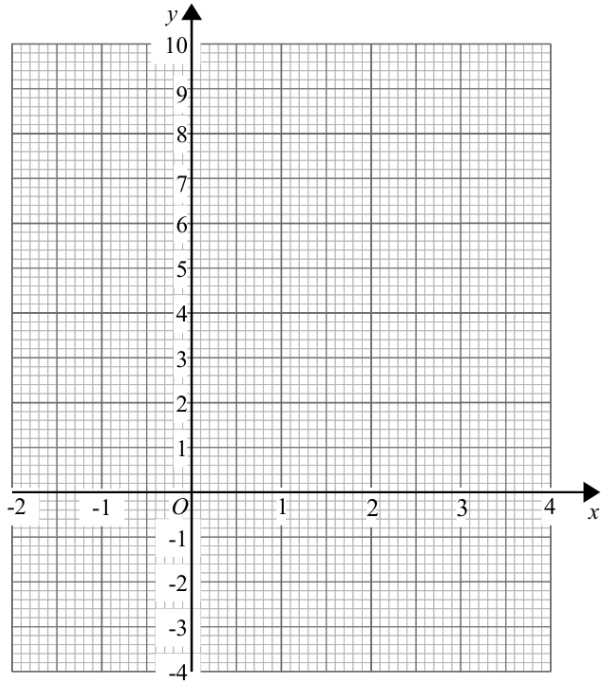


(a) On the grid draw the graph of $y = x^2 + x - 6$

(b) Use the graph to find estimates of the solutions to the equation $x^2 + x - 6 = -2$

5 Complete the table of values for $y = x^2 - 3x - 1$

x	-2	-1	0	1	2	3	4
y							

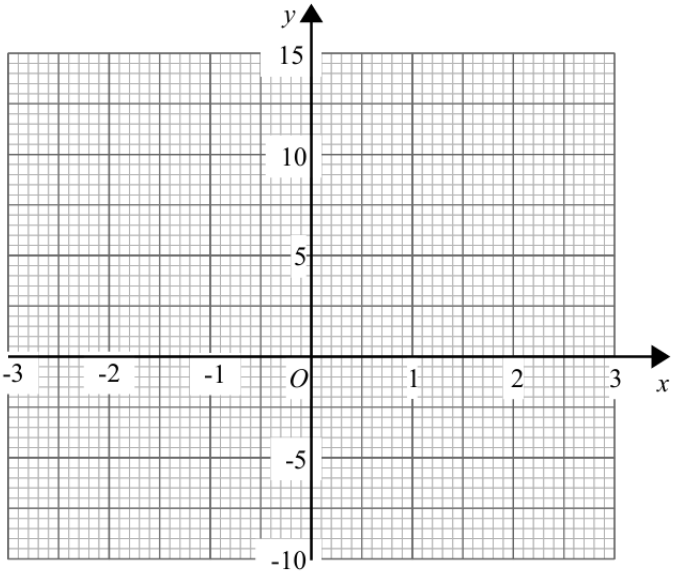


(a) On the grid draw the graph of $y = x^2 - 3x - 1$

(b) Use the graph to find an estimate of the turning point of the graph $y = x^2 - 3x - 1$

6 Complete the table of values for $y = x^2 - 2x - 5$

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

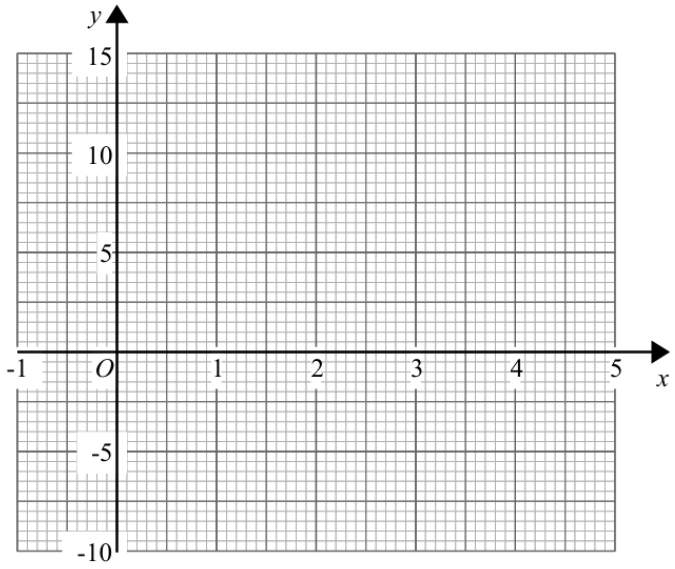


(a) On the grid draw the graph of $y = x^2 - 2x - 5$

(b) Use the graph to find an estimate of a solution to the equation $x^2 = 2x + 5$

7 Complete the table of values for $y = 7x - x^2$

x	-1	0	1	2	3	4	5
y							



(a) On the grid draw the graph of $y = 7x - x^2$

(b) Use the graph to find an estimate of the turning point of the graph $y = 7x - x^2$

(c) Find the solutions to the equation $7x - x^2 = 0$

Name: _____

GCSE (1 – 9)

Cubic and Reciprocal Graphs

Instructions

• Use **black** ink or ball-point pen.
• Answer all questions.
• Answer the questions in the spaces provided
– *there may be more space than you need.*
• Diagrams are **NOT** accurately drawn, unless otherwise indicated.
• You must **show all your working out.**

Information

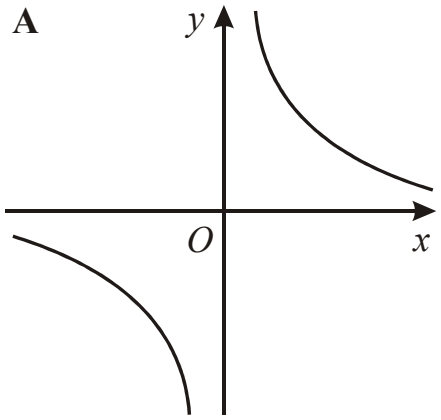
• The marks for each question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

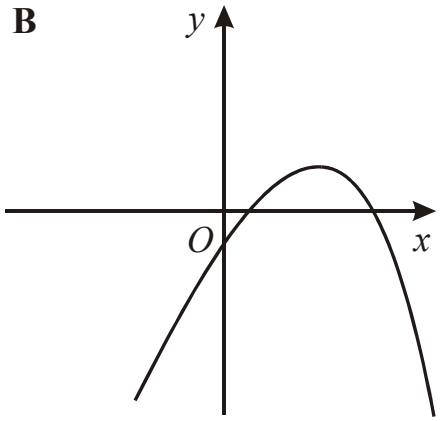
• Read each question carefully before you start to answer it.
• Keep an eye on the time.
• Try to answer every question.
• Check your answers if you have time at the end

1 Here are nine graphs.

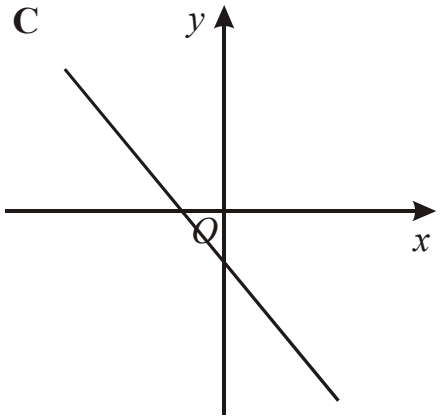
A



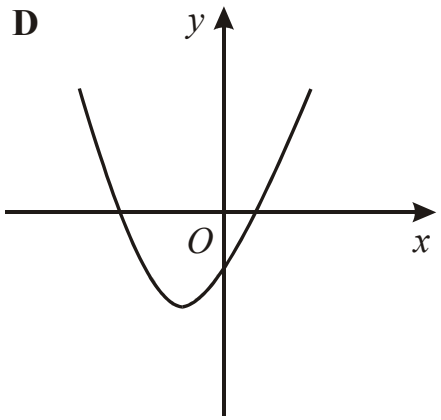
B



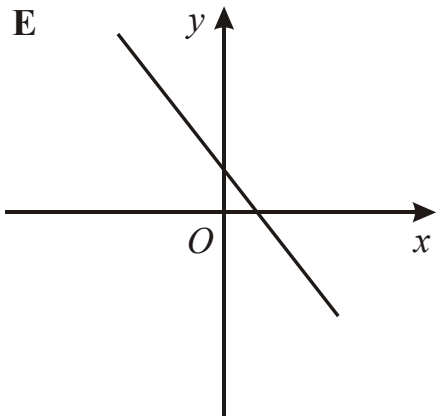
C



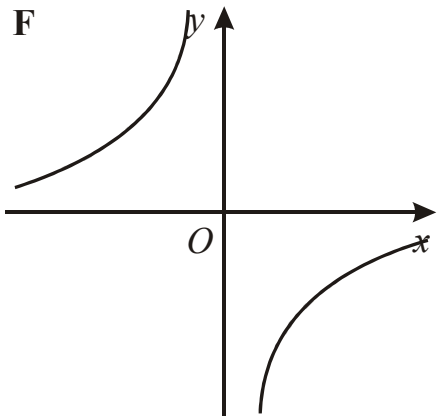
D



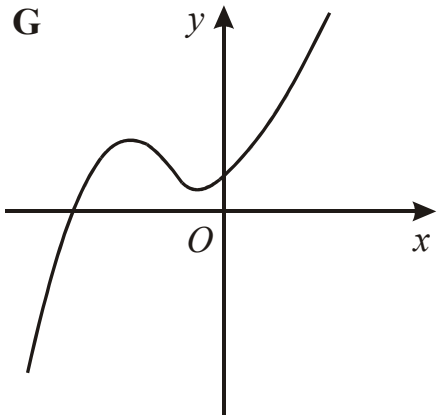
E



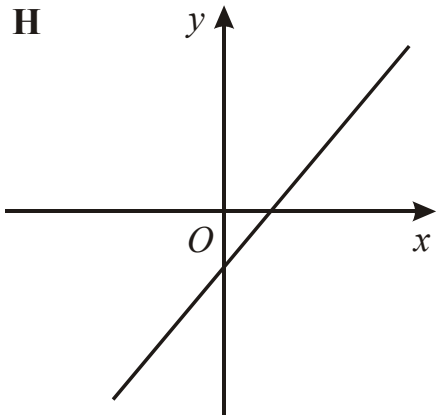
F



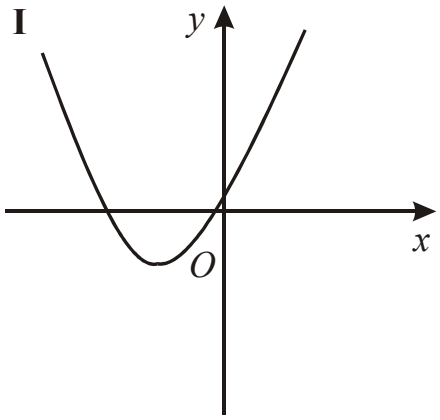
G



H



I



Write down the letter of the graph that could have the equation:

(i) $y = 3x - 2$

.....
(1)

(ii) $y = 2x^2 - 5x - 3$

.....
(1)

(iii) $y = \frac{3}{x}$

.....
(1)

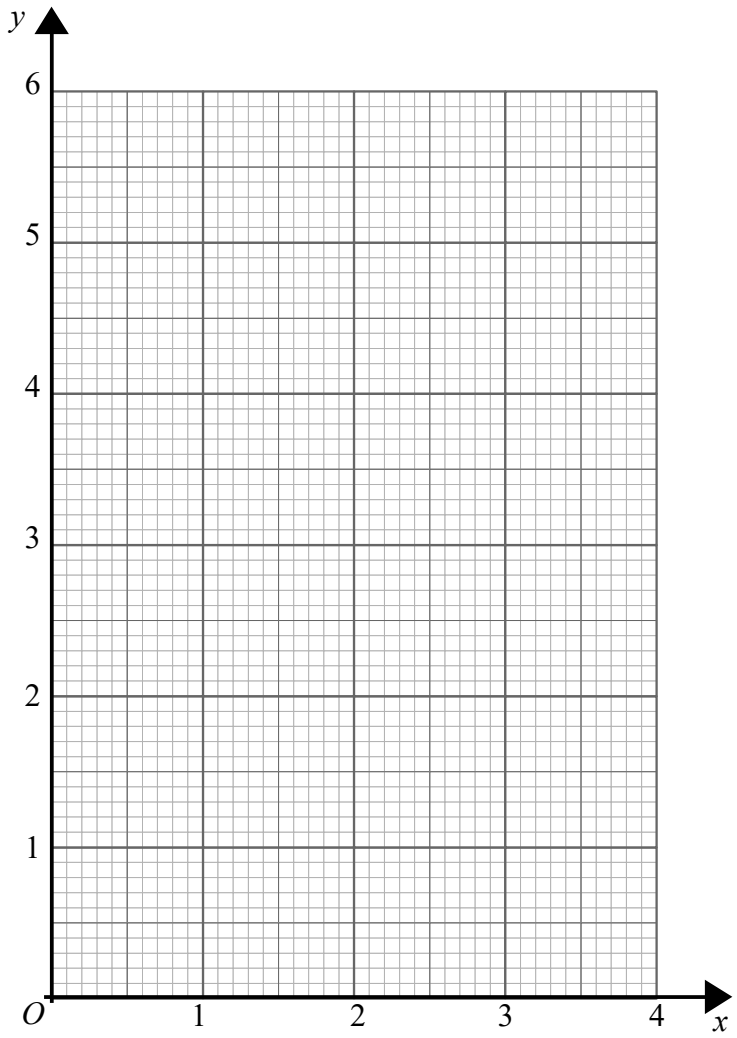
(Total for Question 1 is 3 marks)

2 (a) Complete the table of values for $y = \frac{1}{x}$

x	0.2	0.4	0.8	1	2	4
y						

(2)

(b) On the grid, draw the graph of $y = \frac{1}{x}$



(2)

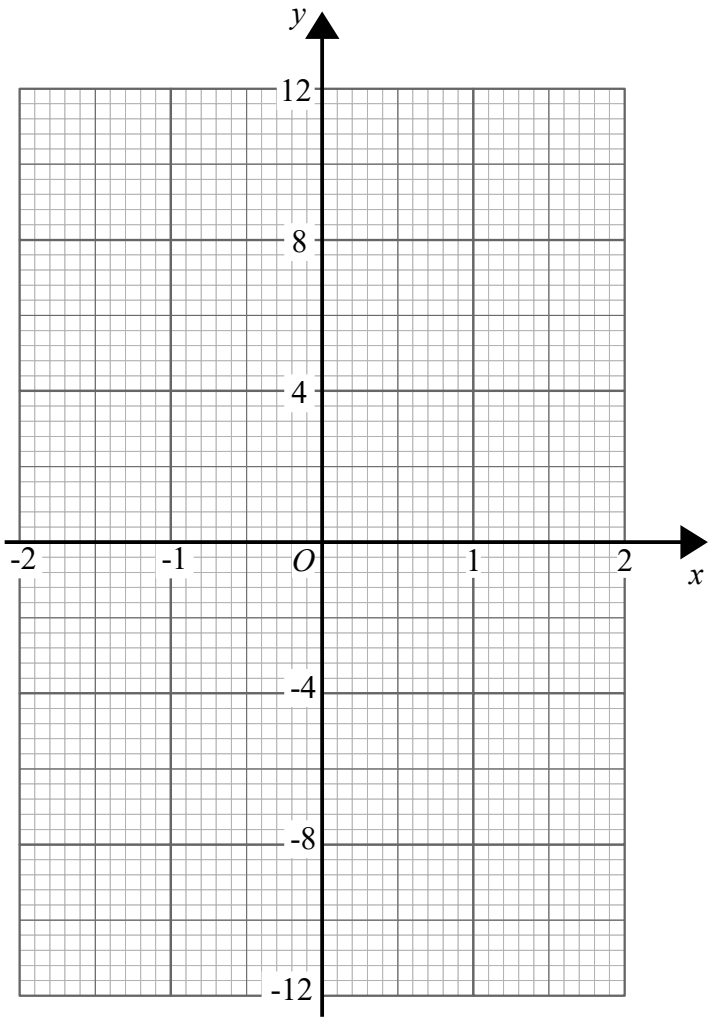
(Total for Question 2 is 4 marks)

3 (a) Complete the table of values for $y = x^3 + x - 2$

x	-2	-1	0	1	2
y					

(2)

(b) On the grid, draw the graph of $y = x^3 + x - 2$



(2)

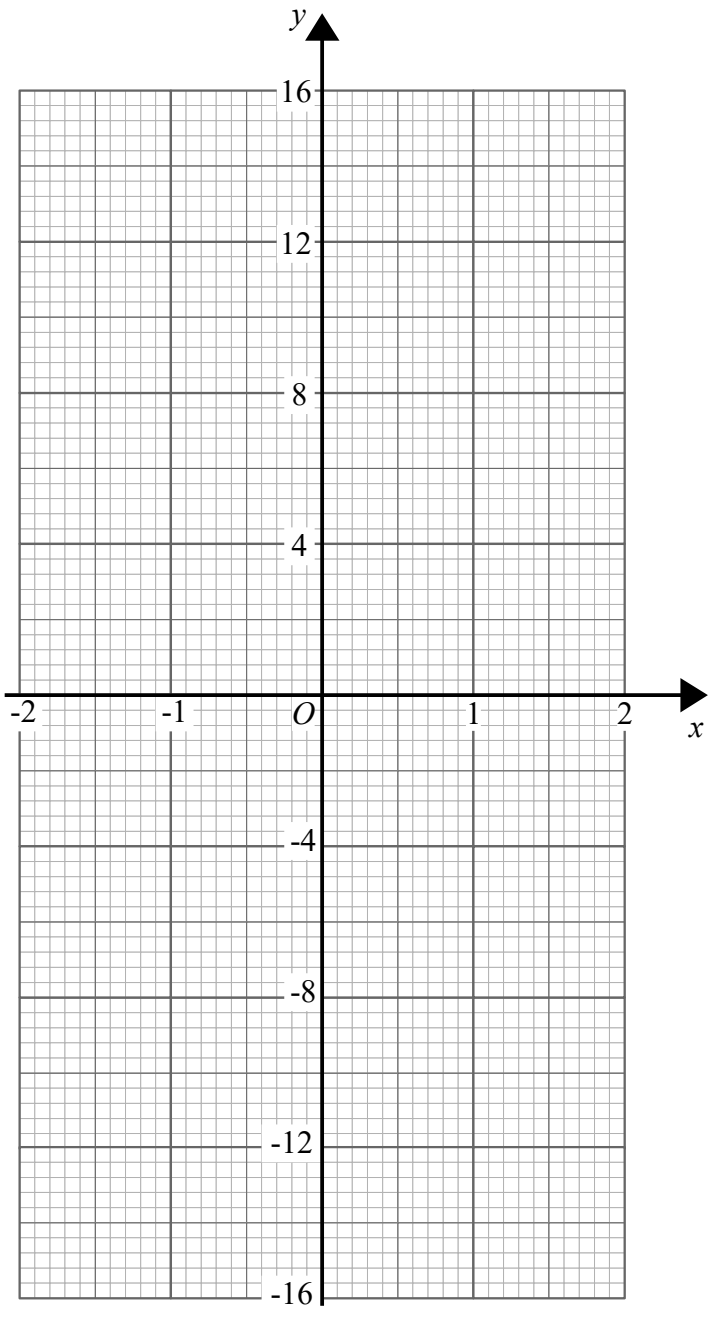
(Total for Question 3 is 4 marks)

4 (a) Complete the table of values for $y = x^3 + 3x$

x	-2	-1	0	1	2
y					

(2)

(b) On the grid, draw the graph of $y = x^3 + 3x$



(2)

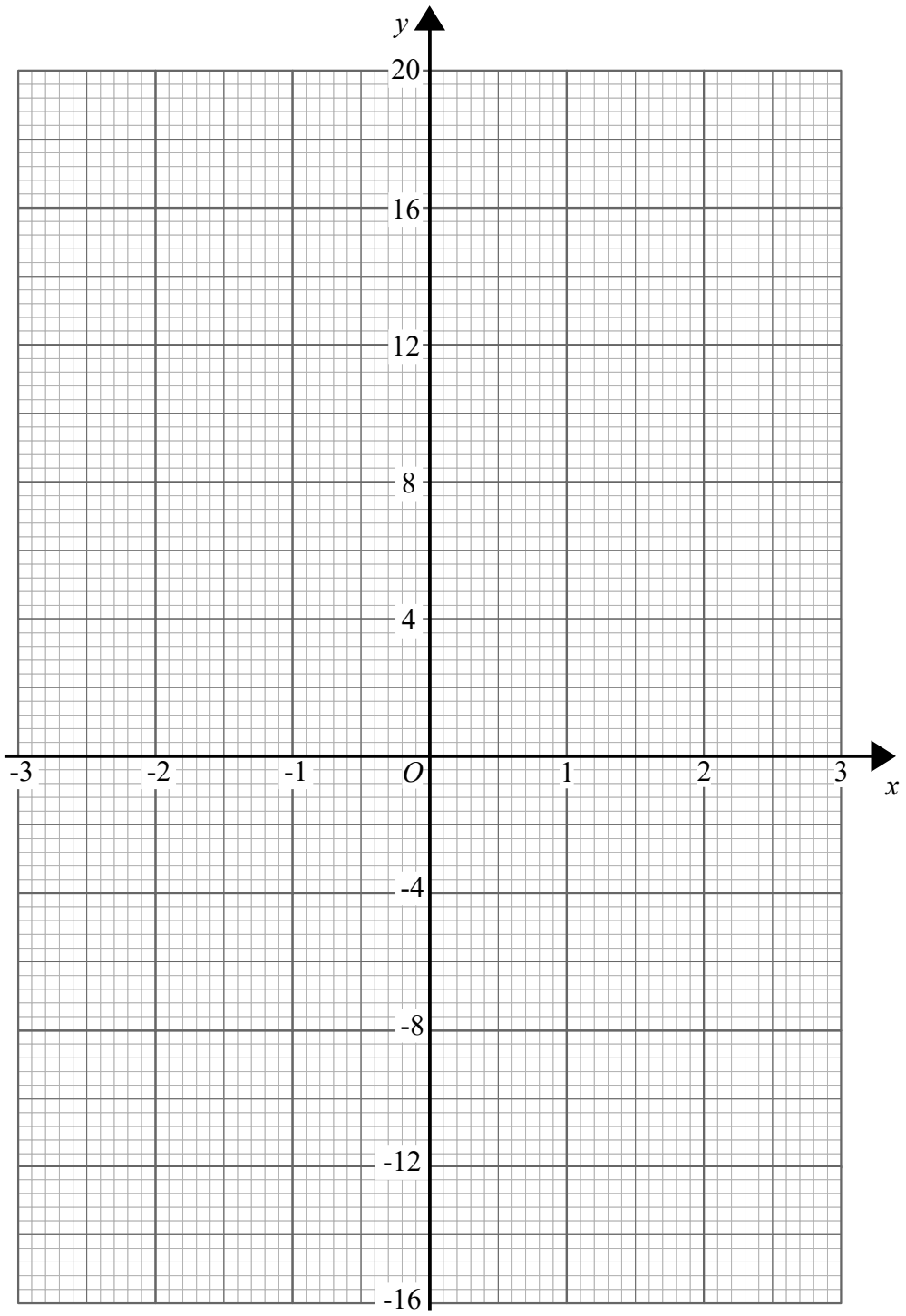
(Total for Question 4 is 4 marks)

5 (a) Complete the table of values for $y = x^3 - 3x + 2$

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

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x + 2$



(2)

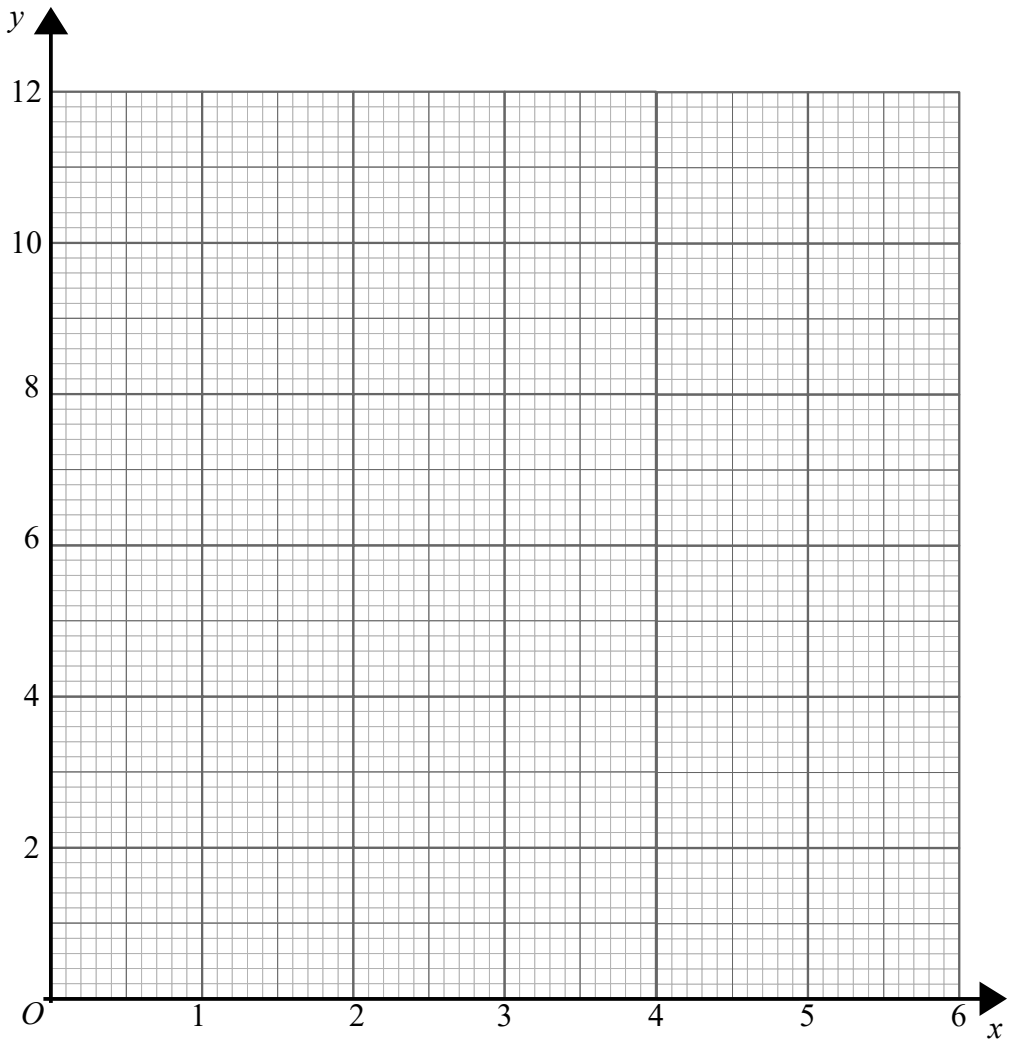
(Total for Question 5 is 4 marks)

6 (a) Complete the table of values for $y = \frac{6}{x}$

x	0.5	1	1.5	2	3	4	5	6
y								

(2)

(b) On the grid, draw the graph of $y = \frac{6}{x}$



(2)

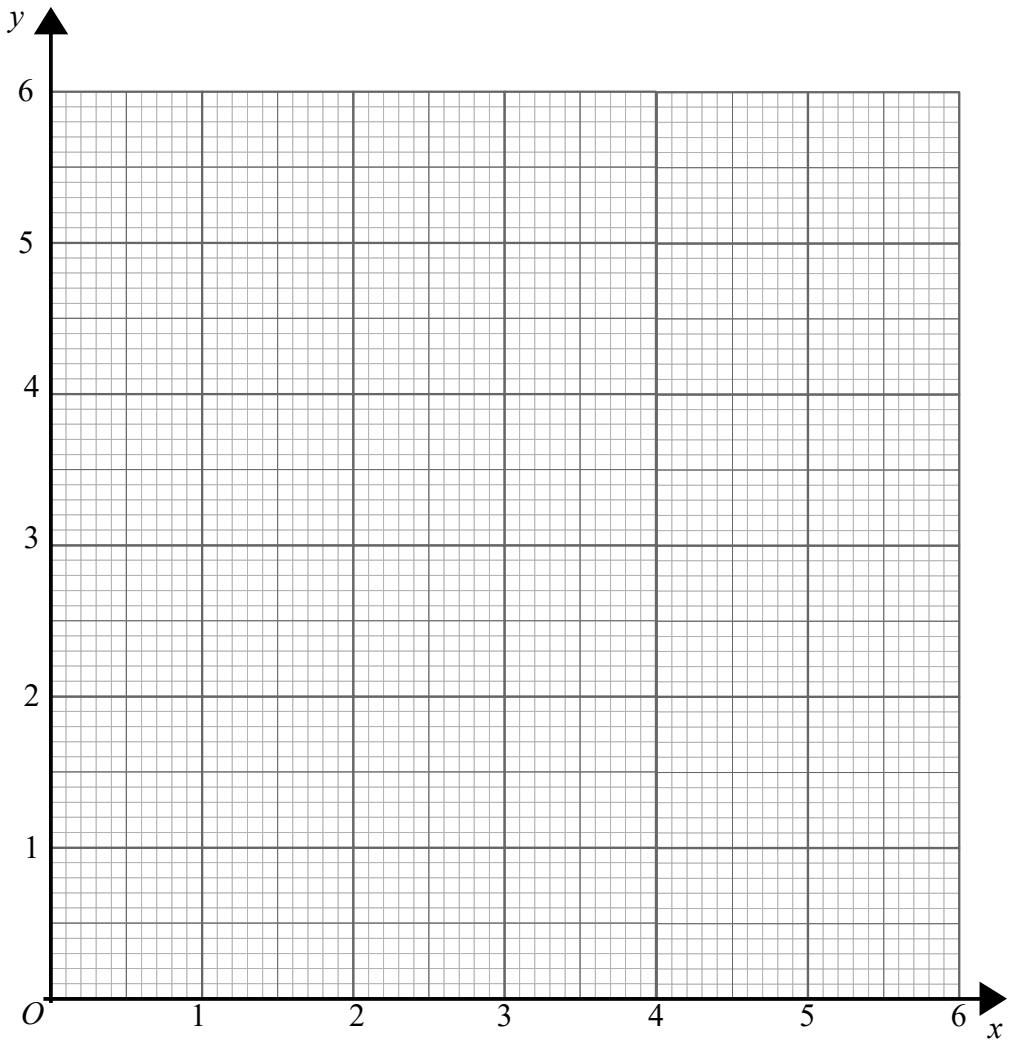
(Total for Question 6 is 4 marks)

7 (a) Complete the table of values for $y = x + \frac{1}{x}$

x	0.2	0.4	0.6	0.8	1	2	4	5
y								

(2)

(b) On the grid, draw the graph of $y = x + \frac{1}{x}$



(2)

(Total for Question 7 is 4 marks)

1 Solve the simultaneous equations

$$4x + 3y = 18$$
$$x - 3y = 7$$

(3 marks)

2 Solve the simultaneous equations

$$x - 3y = -23$$
$$5x + 2y = 4$$

(3 marks)

3 Solve the simultaneous equations

$$2x + 5y = -10$$
$$2x - y = 8$$

(3 marks)

4 Solve the simultaneous equations

$$4x + 2y = 10$$
$$5x + 3y = 12$$

(3 marks)

5 Solve the simultaneous equations

$$2x + 5y = 4$$
$$7x - 5y = -1$$

(3 marks)

6 Solve the simultaneous equations

$$3x - 2y = 7$$
$$7x + 2y = 13$$

(3 marks)

7 Solve the simultaneous equations

$$2x - 3y = 4$$
$$4x - y = 13$$

(3 marks)

8 Solve the simultaneous equations

$$3x + y = 15$$
$$5x + 2y = 24$$

(3 marks)

9 Solve the simultaneous equations

$$3x - y = -4$$
$$2x - 3y = 9$$

(3 marks)

10 Solve the simultaneous equations

$$6x + 5y = 4.5$$
$$3x - 2y = 9$$

(3 marks)

11 Solve the simultaneous equations

$$3x = 9 + y$$
$$x + 5y = 5$$

(3 marks)

12 Solve the simultaneous equations

$$3y + 11 = 4x$$
$$10x + 2y + 1 = 0$$

(3 marks)

13 In a shop 2 coffees and 3 cakes cost £9.95
In the same shop 1 coffee and 4 cakes cost £10.35.

Work out the price for one coffee and the price for one cake.

(3 marks)

14 Sweets are sold in small packs and in big packs.
There is a total of 175 sweets in 4 small packs and 3 big packs.
There is a total of 154 sweets in 5 small packs and 2 big packs.
Work out the number of sweets in each small pack and in each big pack.

(3 marks)

Workings Out Page

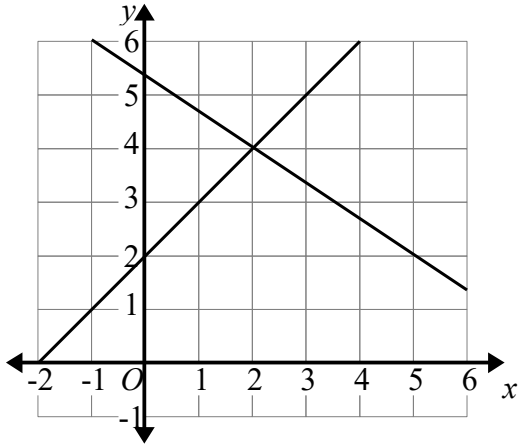
Workings Out Page

Workings Out Page

Workings Out Page

1

The graphs of the straight lines with equations $y = x + 2$ and $2x + 3y = 16$ have been drawn on the grid.

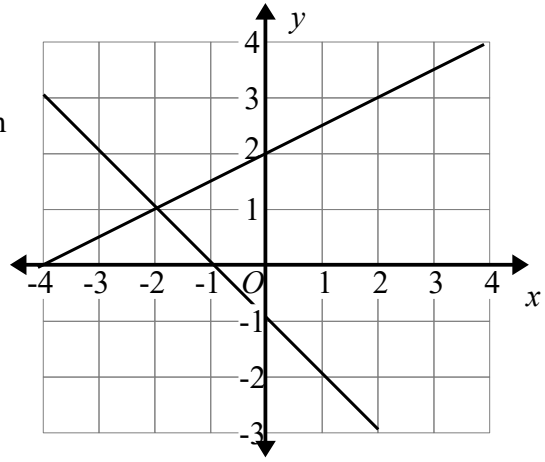


Use the graphs to solve the simultaneous equations $y = x + 2$, $2x + 3y = 16$

(2 marks)

2

The graphs of the straight lines with equations $2y - x = 4$ and $x + y = -1$ have been drawn on the grid.



Use the graphs to solve the simultaneous equations $2y - x = 4$, $x + y = -1$

(2 marks)

3 (a) On the same grid, draw the graphs of of $4y - 6x = 7$ and $y = -2x$

(2)

(b) Use the graphs to solve the simultaneous equations $4y - 6x = 7$, $y = -2x$

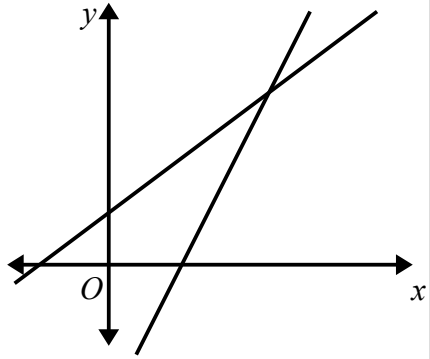
(2)

(4 marks)

4

The diagram shows two straight lines.
The equation of the lines are $y = 4x - 5$ and $y = 2x + 1$

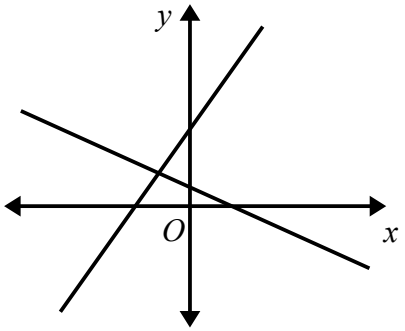
Work out the coordinates of the point where the line intersect.



(3 marks)

5 The diagram shows two straight lines.

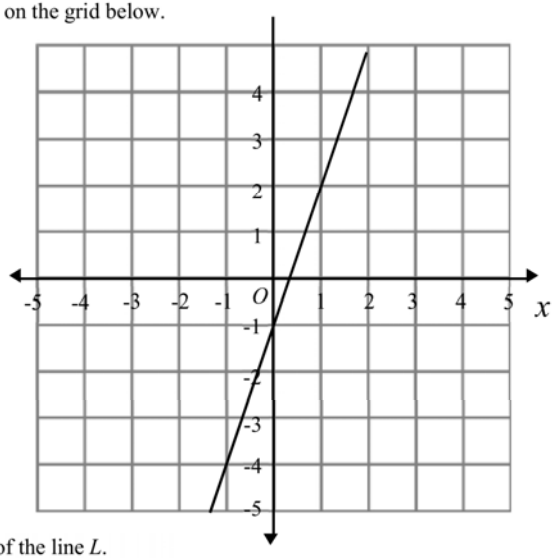
The equation of the lines are $y = 2x + 3$ and $y = -\frac{2}{3}x + 1$



Work out the coordinates of the point where the line intersect.

(3 marks)

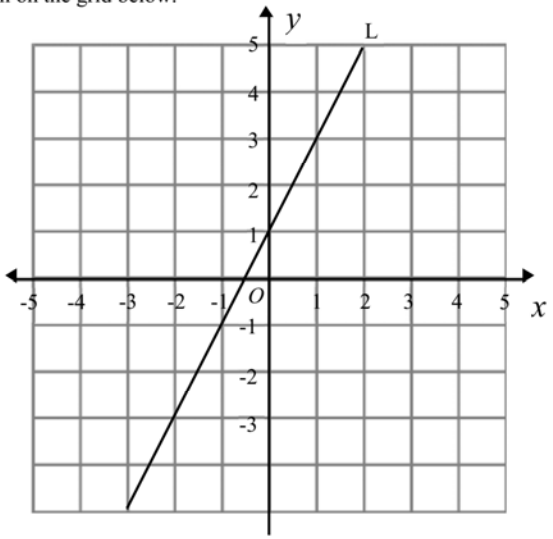
1 The line L is drawn on the grid below.



Find the gradient of the line L.

(1 mark)

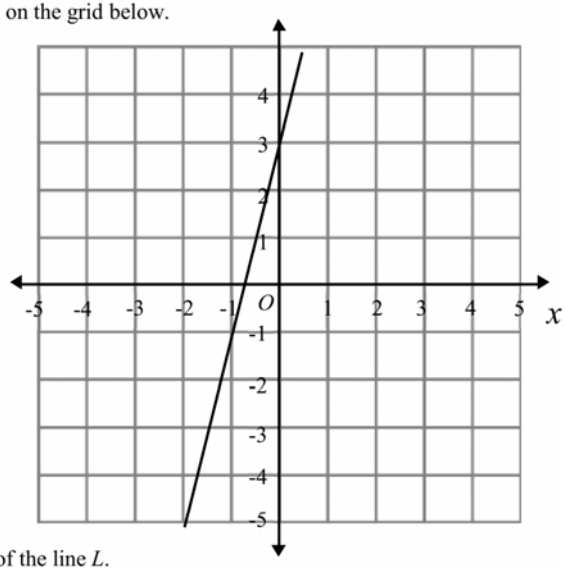
2 The line L is drawn on the grid below.



Find the gradient of the line

(1 mark)

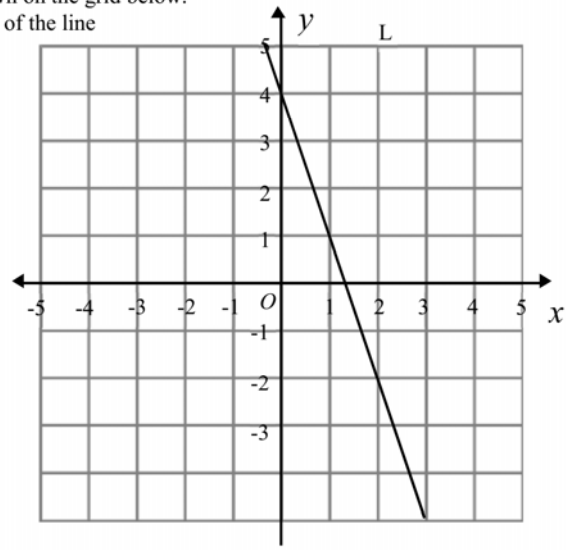
3 The line L is drawn on the grid below.



Find the gradient of the line L.

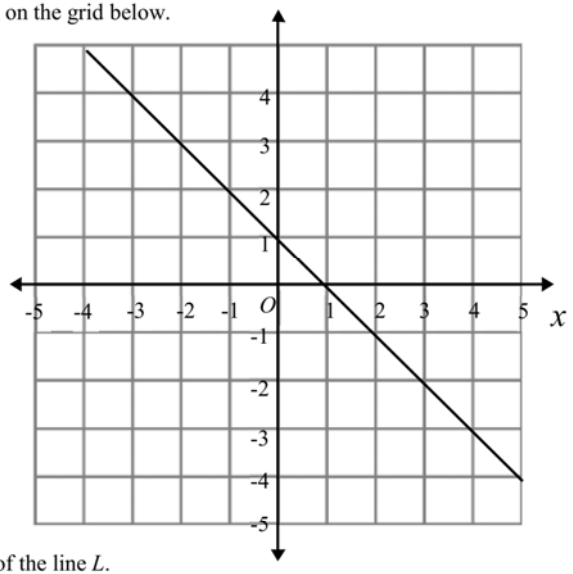
(1 mark)

4 The line L is drawn on the grid below.
Find the gradient of the line



(1 mark)

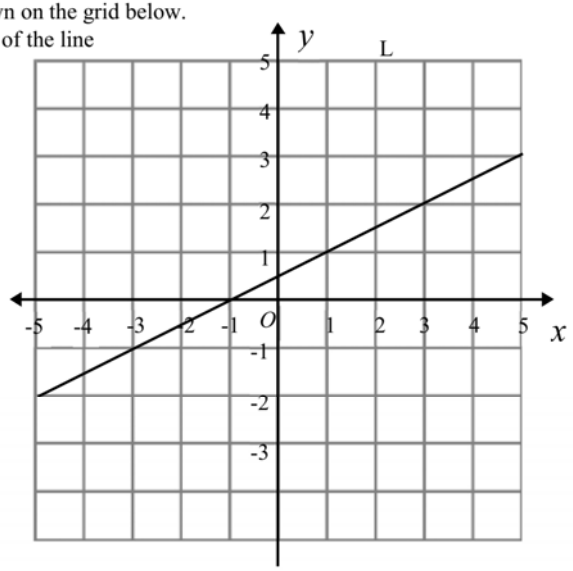
5 The line L is drawn on the grid below.



Find the gradient of the line L.

(1 mark)

6 The line L is drawn on the grid below.
Find the gradient of the line



(1 mark)

7 Find the gradient of the line that passes through (2, 1) and (5, 10).

(2 marks)

8 Find the gradient of the line that passes through (5, 4) and (7, 0).

(2 marks)

9 Find the gradient of the line that passes through (-3, 4) and (5, 8).

(2 marks)

10 Find the gradient of the line that passes through (3, 7) and (1, 10).

(2 marks)

11 Find the gradient of the line that passes through (1, -1) and (-3, -9).

(2 marks)

12 Find the gradient of the line that passes through (8, 1) and (3, -3).

(2 marks)

13 Find the gradient of the line that passes through (3, -1) and (-2, 9).

(2 marks)

14 Find the gradient of the line that passes through (-1, -2) and (-3, 10).

(2 marks)

15 Find the gradient of the line that passes through (-3, 4) and (-5, 7).

(2 marks)

16 The line AB passes through the points A(2, -1) and $(6, k)$.
The gradient of AB is 5.
Work out the value of k.

(3 marks)

17 The line AB passes through the points A(-3, 4) and $(k, 12)$.
The gradient of AB is 4.
Work out the value of k.

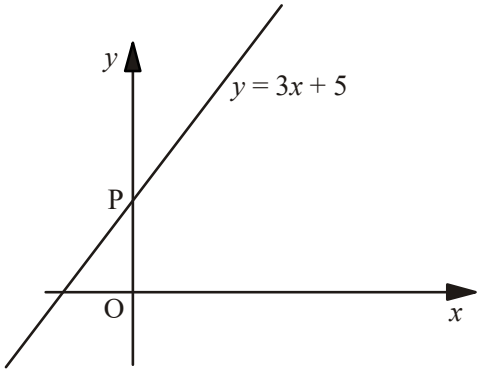
(3 marks)

18 The line AB passes through the points A$(-2, k)$ and (4, 8).
The gradient of AB is -2.
Work out the value of k.

(3 marks)

Workings Out Page

1



(a) The line $y = 3x + 5$ crosses the y axis at P.
What is the value of y at P? **(1)**

(b) Write down the equation of another line which is parallel to $y = 3x + 5$ **(1)**

(2 marks)

---

2 A line passes through the point (0, 4).
The gradient of this line is 2.
Write down the equation of this line.

(2 marks)

---

3 A line passes through the point (0, -5).
The gradient of this line is 3.
Write down the equation of this line.

(2 marks)

---

4 A straight line has equation $y = 5 – 3x$

(a) Write down the gradient of the line. **(1)**

(b) Write down the coordinates of the point where the line crosses the y axis. **(1)**

(2 marks)

---

5 A straight line has equation $y = 3x – 2$

(a) Write down the gradient of the line. **(1)**

(b) Write down the coordinates of the point where the line crosses the y axis. **(1)**

(2 marks)

---

6 A straight line has equation $y = 2 – x$

(a) Write down the gradient of the line. **(1)**

(b) Write down the coordinates of the point where the line crosses the y axis. **(1)**

(2 marks)

---

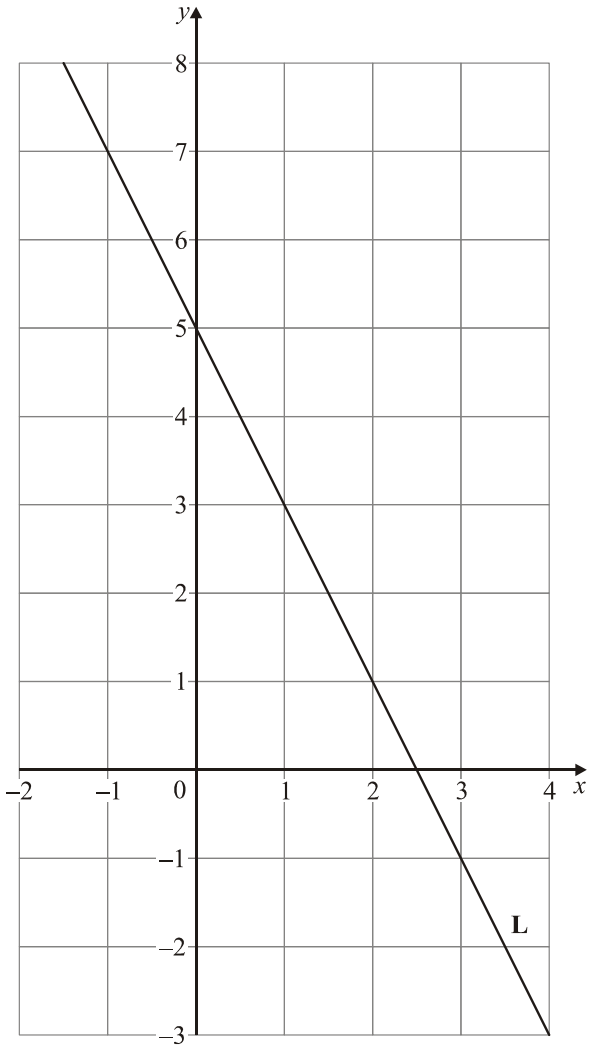
7 A straight line has equation $y = 4x + 3$

(a) Write down the gradient of the line. **(1)**

(b) Write down the coordinates of the point where the line crosses the y axis. **(1)**

(2 marks)

8



Find the equation of line L.

(3 marks)

9 A straight line has equation $2y - 10x = 8$

(a) Work out the gradient of this line. **(2)**

(b) Write down the equation of a line parallel to this line. **(1)**

(3 marks)

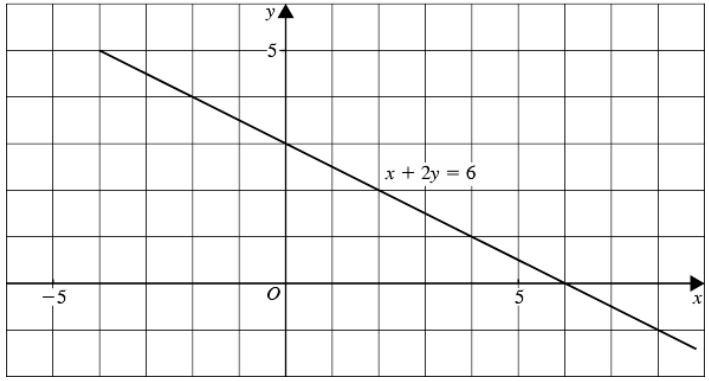
10 A straight line has equation $4y - 5x = 2$

(a) Work out the gradient of this line. **(2)**

(b) Write down the equation of a line parallel to this line. **(1)**

(3 marks)

11 The line with equation $x + 2y = 6$ has been drawn on the grid.



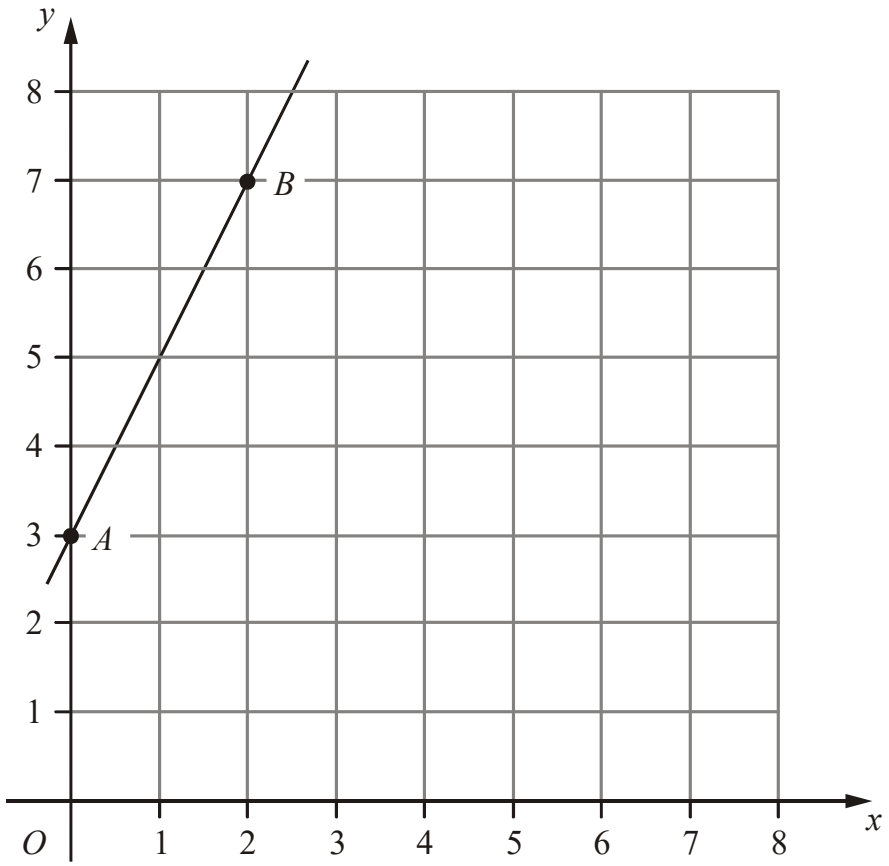
(a) Rearrange the equation $x + 2y = 6$ to make y the subject. **(2)**

(b) Write down the gradient of the line with equation $x + 2y = 6$ **(2)**

(c) Write down the equation of the line which is parallel to the line with equation $x + 2y = 6$ and passes through the point with coordinates (0, 7). **(1)**

(5 marks)

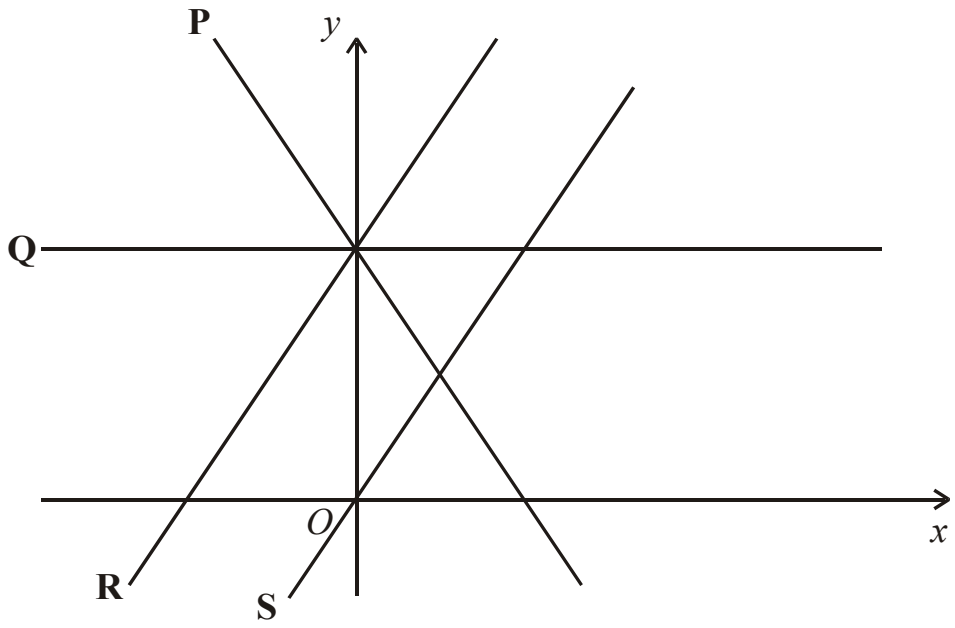
12



Find the equation of the line that passes through A and B.

(3 marks)

13



The diagram shows 4 straight lines, labelled P, Q, R and S.
The equations of the straight lines are:

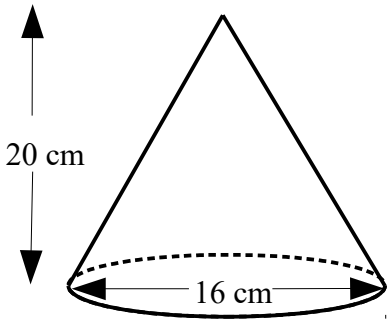
A: $y = 2x$
B: $y = 3 - 2x$
C: $y = 2x + 3$
D: $y = 3$

Match each straight line, P, Q, R and S to its equation.

(2 marks)

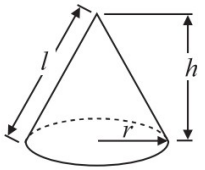
Workings Out Page

1 The diagram shows a cone.



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

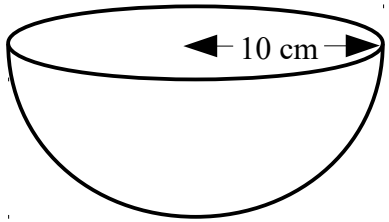


The height of the cone is 20 cm.
The base of the cone has a diameter of 16 cm.

Work out the volume of the cone.
Give your answer correct to 3 significant figures.

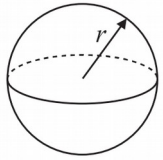
(2 marks)

2 The diagram shows a solid hemisphere with a radius of 10 cm.



Volume of sphere = $\frac{4}{3}\pi r^3$

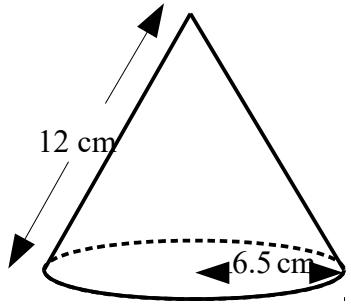
Surface area of sphere = $4\pi r^2$



Work out the total surface area of the hemisphere.
Give your answer in terms of π.

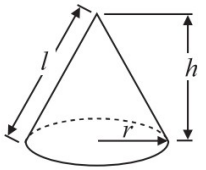
(3 marks)

3 The diagram shows a solid cone.



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

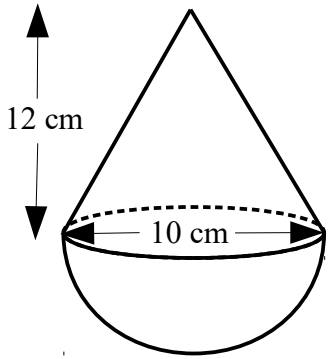


The slanted height of the cone is 12 cm.
The base of the cone has a radius of 6.5 cm.

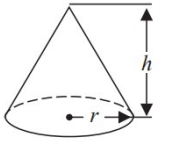
Work out the total surface area of the cone.
Give your correct to 3 significant figures.

(3 marks)

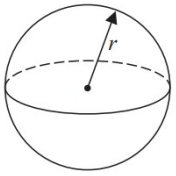
4 The diagram shows a solid shape.
The shape is a cone on top of a hemisphere.



Volume of a cone = $\frac{1}{3}\pi r^2 h$



Volume of a sphere = $\frac{4}{3}\pi r^3$

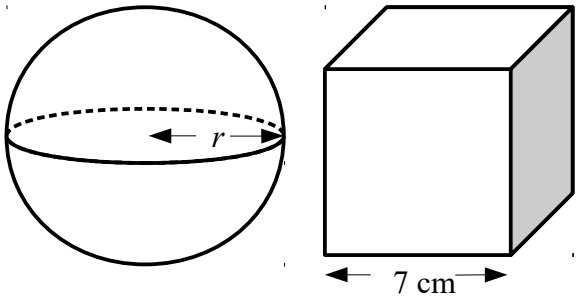


The height of the cone is 12 cm.
The base of the cone has a diameter of 10 cm.
The diameter of the hemisphere is 10 cm.

Work out the total volume of the solid shape.
Give your answer in terms of π.

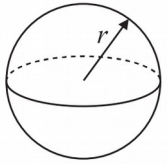
(4 marks)

5 The diagram shows a sphere and a cube.



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



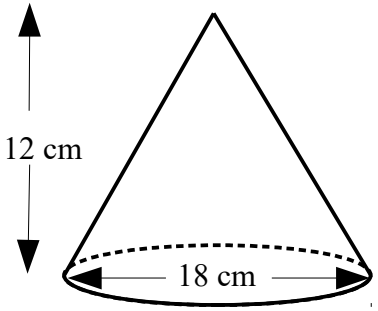
The cube has length 7 cm.

The sphere and the cube have the same volume.
Work out the radius of the sphere.

Give your answer correct to 3 significant figures.

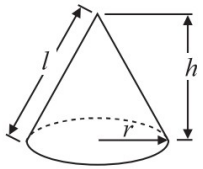
(4 marks)

6 The diagram shows a solid cone.



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

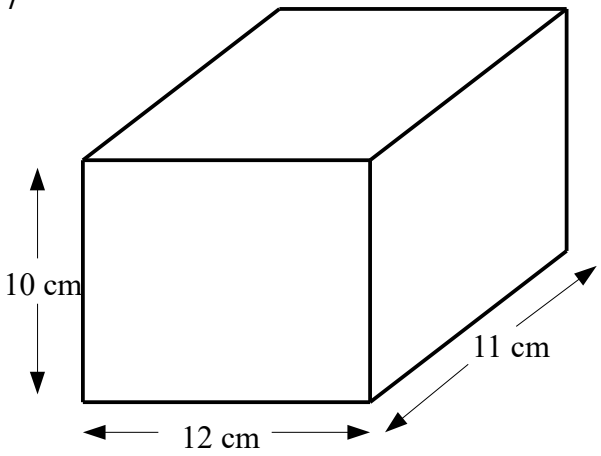


The height of the cone is 12 cm.
The base of the cone has a diameter of 18 cm.

Work out the total surface area of the cone.
Give your answer in terms of π.

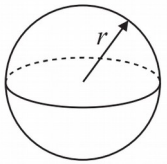
(4 marks)

7



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



A rectangular container is 12 cm long, 11 cm wide and 10 cm high.
The container is filled with water to a depth of 8 cm.

A metal sphere of radius 3.5 cm is placed in the water.
It sinks to the bottom.

Calculate the rise in the water level.
Give your answer correct to 3 significant figures

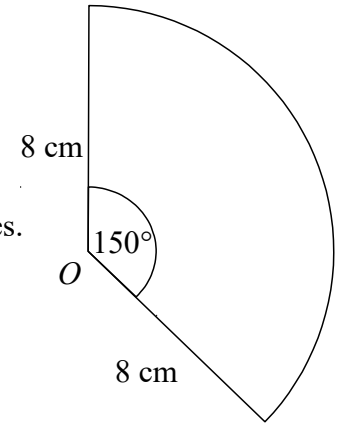
(4 marks)

Workings Out Page

Workings Out Page

1 The diagram shows a sector, centre O.
The radius of the circle is 8 cm.
The angle of the sector is 150°.

Calculate the area of the sector.
Give your answer correct to 3 significant figures.



(2 marks)

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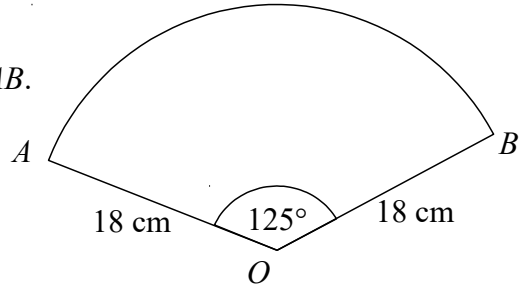
2 AOB is a sector of a circle, centre O and radius 18 cm.
The angle of the sector is 125°.

Calculate the length of the arc AB.
Give your answer in terms of π.

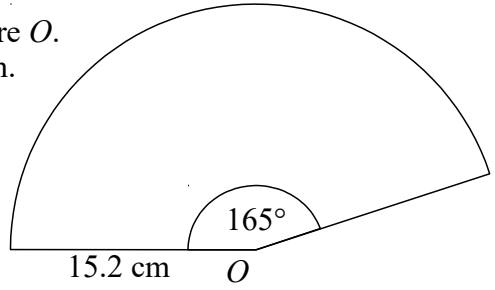


(2 marks)

---

3 The diagram shows a sector, centre O.
The radius of the circle is 15.2 cm.
The angle of the sector is 165°.

Calculate the area of the sector.
Give your answer correct to
3 significant figures.

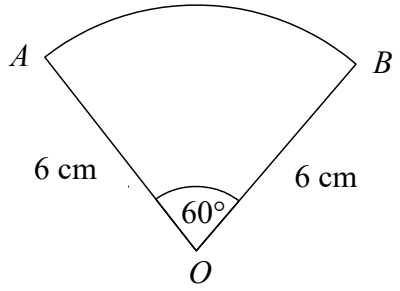


(3 marks)

---

4 AOB is a sector of a circle, centre O and radius 6 cm.
The angle of the sector is 60°.

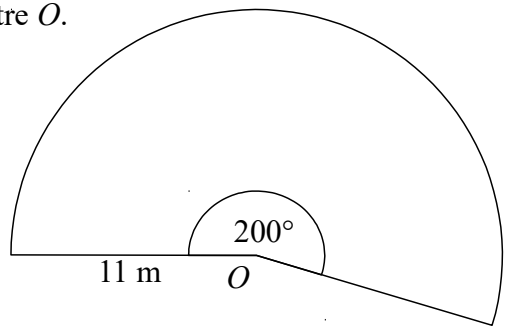
Find the length of the arc AB.
Give your answer in terms of π.



(2 marks)

---

5 The diagram shows a sector, centre O.
The radius of the circle is 11 m.
The angle of the sector is 200°.



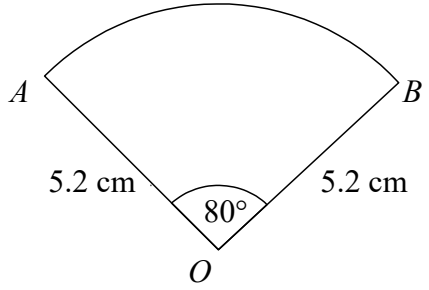
Calculate the area of the sector.
Give your answer correct to 3 significant figures.

(2 marks)

---

6 AOB is a sector of a circle, centre O and radius 5.2 cm.
The angle of the sector is 80°.

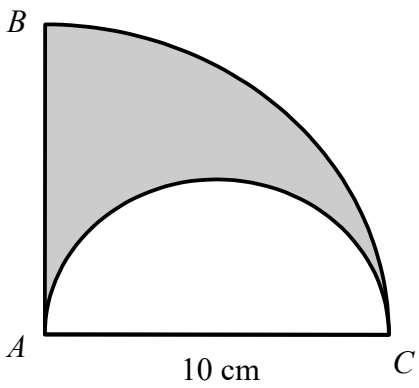
Find the **perimeter** of the sector.
Give your answer correct to
3 significant figures.



(3 marks)

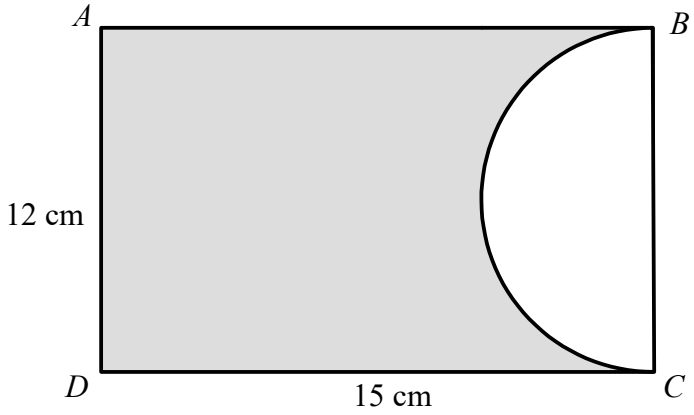
7 *BAC* is a sector of a circle, centre *A*.
AC is the diameter of a semi circle.
AC is 10 cm.

Find the area of the shaded region.
Give your answer in terms of π.



(4 marks)

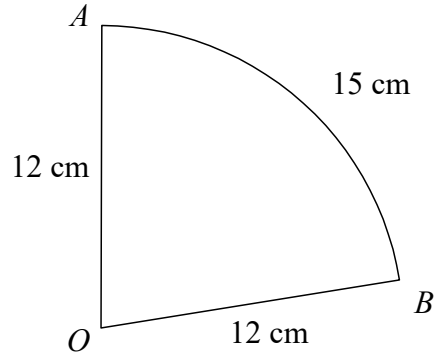
8 The diagram shows a rectangle, *ABCD,* and a semi circle.
BC is the diameter of a semi circle.



Calculate the percentage of the area of the rectangle that is shaded.
Give your answer correct to 1 decimal place.

(4 marks)

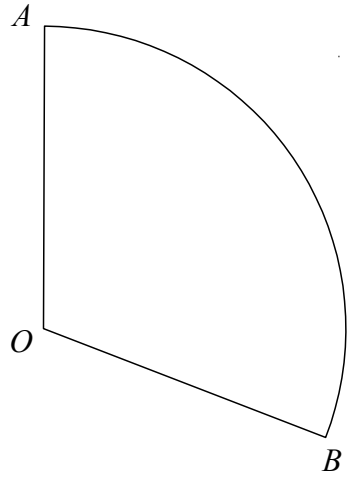
9 AOB is a sector of a circle, centre *O* and radius 12 cm.
The length of arc AB is 15 cm.



Find the area of the sector.

(4 marks)

10 AOB is a sector of a circle, centre *O* and radius 9 cm.
The length of arc AB is 6π cm.



Find the area of the sector.
Give your answer in terms of π.

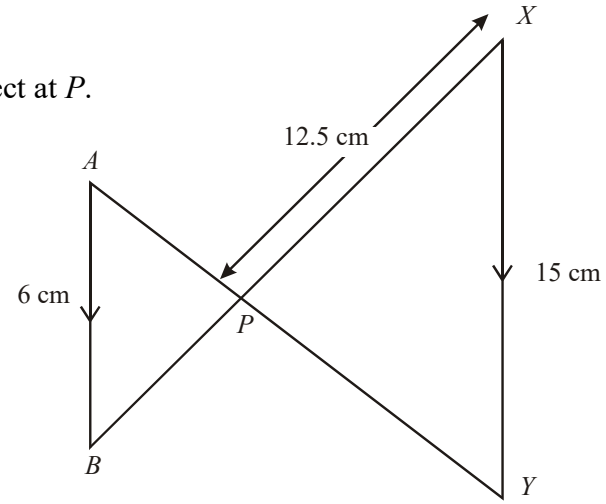
(4 marks)

Workings Out Page

Workings Out Page

1 *AB* is parallel to *XY*.
The lines *AY* and *BX* intersect at *P*.
AB = 6 cm.
XP = 12.5 cm.
XY = 15 cm.

Work out the length of *BP*.



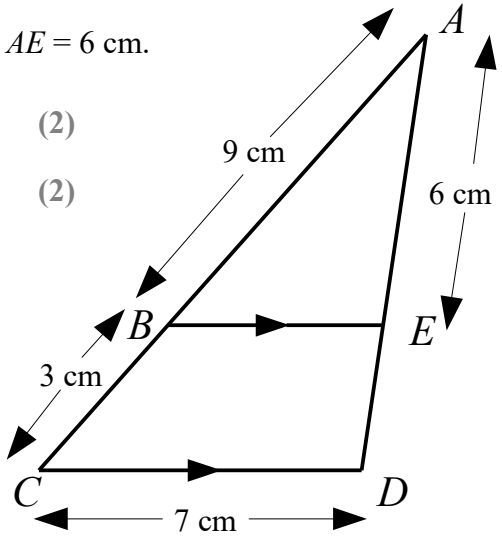
(3 marks)

---

2 *BE* is parallel to *CD*.
AB = 9 cm, *BC* = 3 cm, *CD* = 7 cm, *AE* = 6 cm.

(a) Calculate the length of *ED*. **(2)**

(b) Calculate the length of *BE*. **(2)**

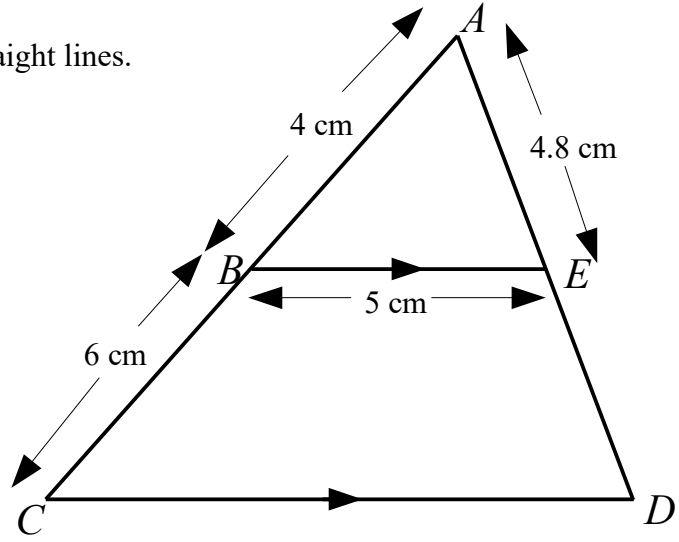


(4 marks)

---

3 *BE* is parallel to *CD*.
ABC and *AED* are straight lines.

AB = 4 cm
BC = 6 cm
BE = 5 cm
AE = 4.8 cm.



(a) Calculate the length of *CD*. **(2)**

(b) Calculate the length of *ED*. **(2)**

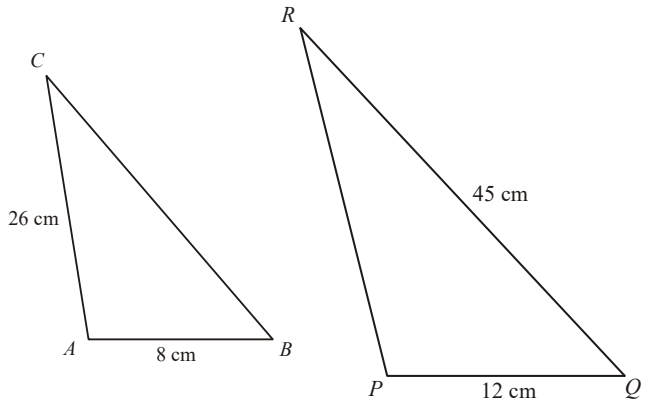
(4 marks)

---

4 The two triangles ABC and PQR are mathematically similar.

Angle A = angle P.
Angle B = angle Q.

AB = 8 cm.
AC = 26 cm.
PQ = 12 cm.
QR = 45 cm

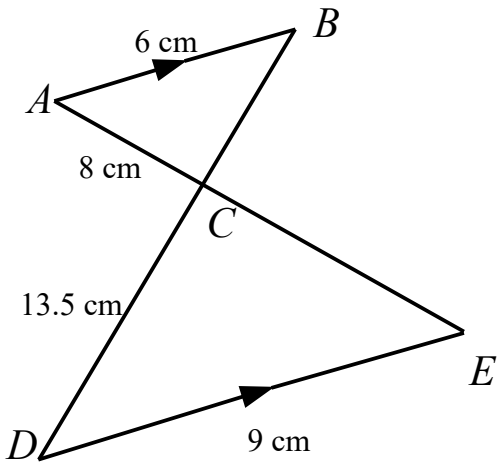


(a) Calculate the length of *PR*.

(b) Calculate the length of *BC*.

(4 marks)

5 *AB* is parallel to *DE*.
ACE and *BCD* are straight lines.
AB = 6 cm,
AC = 8 cm,
CD = 13.5 cm,
DE = 9 cm.

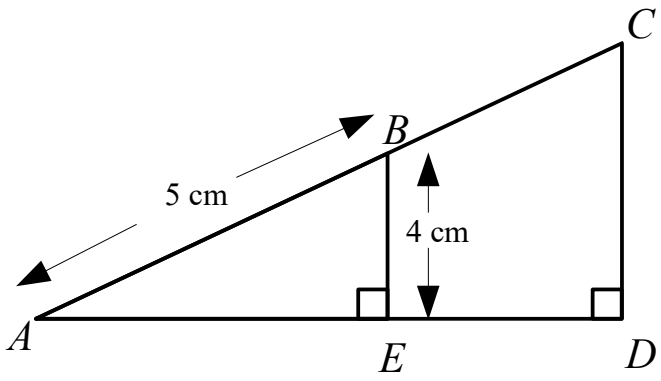


(a) Calculate the length of *CE*.

(b) Calculate the length of *BC*.

(4 marks)

6



AB: AC = 1: 3

(a) Calculate the length of *CD*. **(2)**

(b) Calculate the length of *BC*. **(2)**

(4 marks)

7

A 20 Euro note is a rectangle 133 mm long and 72 mm wide.
A 500 Euro Note is a rectangle 160 mm long and 82 mm wide.

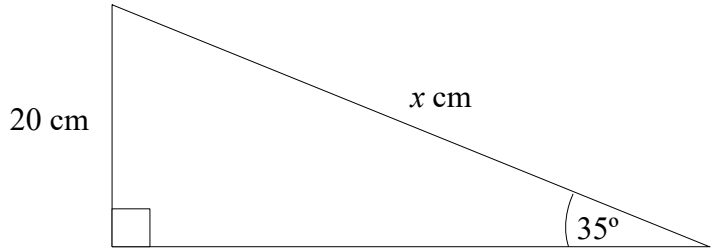
Show that the two rectangles are not mathematically similar.

(3 marks)

Workings Out Page

Workings Out Page

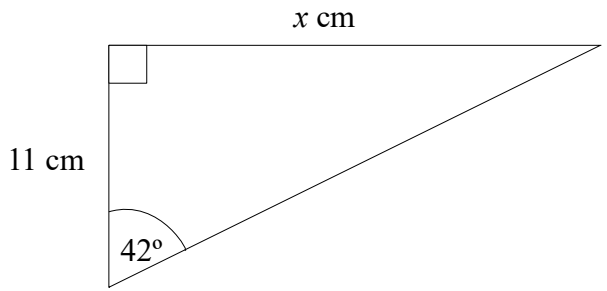
1



Work out the value of x.

(2 marks)

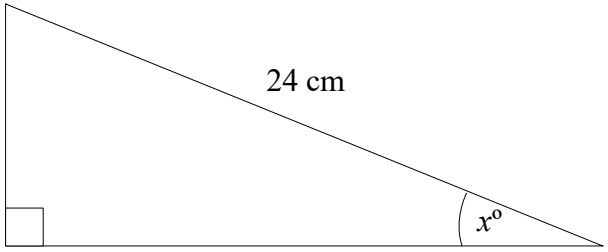
2



Work out the value of x.

(2 marks)

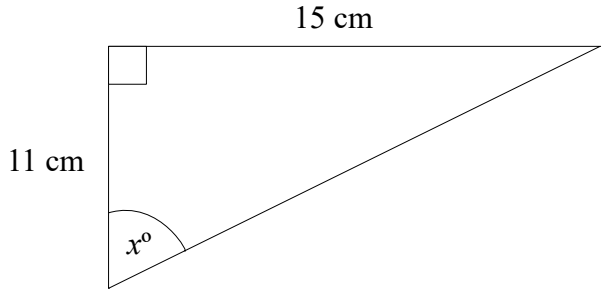
3



Work out the value of x.

(2 marks)

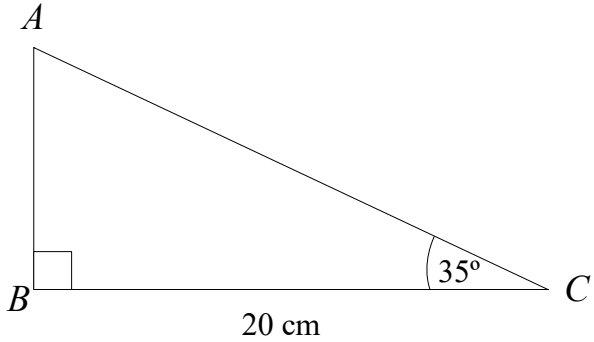
4



Work out the value of x.

(2 marks)

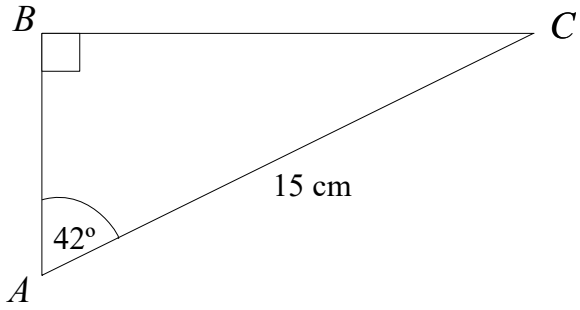
5



Calculate the length AB.

(2 marks)

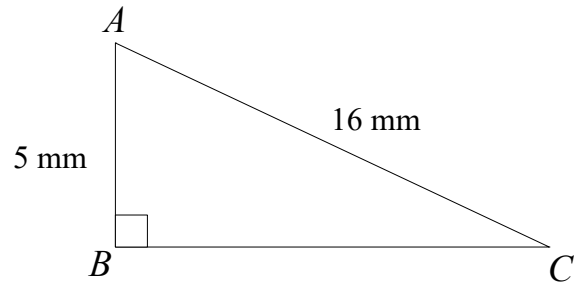
6



Calculate the length AB.

(2 marks)

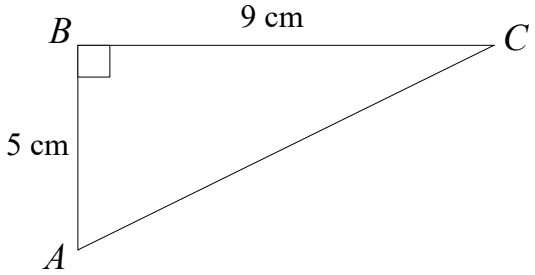
7



Calculate the size of angle *ACB*.

(2 marks)

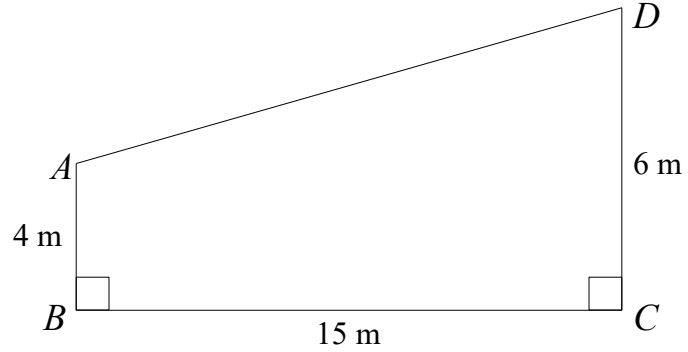
8



Calculate the size of angle *BAC*.

(2 marks)

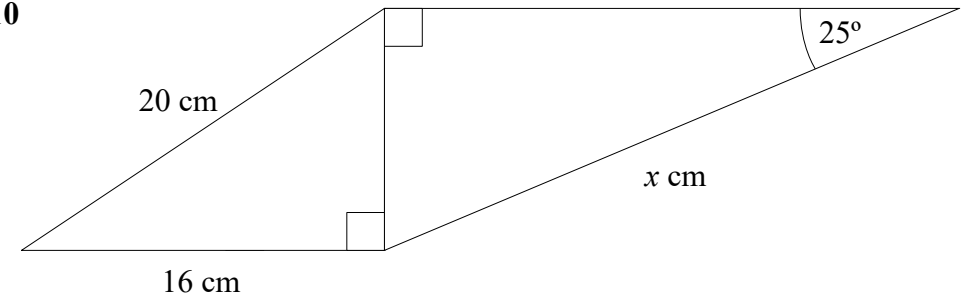
9



Work out the size of angle *BAD*.
Give your answer to 1 decimal place.

(3 marks)

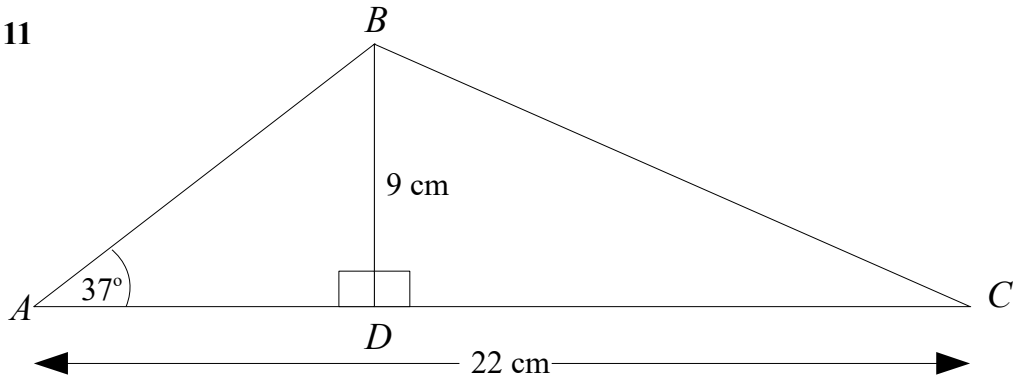
10



Work out the value of *x*.
Give your answer to 1 decimal place.

(4 marks)

11



Work out the size of angle *BCD*.
Give your answer to 1 decimal place.

(4 marks)

Workings Out Page

Workings Out Page

1 Write down the exact value of sin (45)

(1 mark)

2 Write down the exact value of cos (90°)

(1 mark)

3 Write down the exact value of tan (30)

(1 mark)

4 Write down the exact value of sin (30°)

(1 mark)

5 Write down the exact value of tan (45)

(1 mark)

6 Write down the exact value of cos (0°)

(1 mark)

7 Write down the exact value of sin (60)

(1 mark)

8 Write down the exact value of sin (0)

(1 mark)

9 Write down the exact value of cos (60°)

(1 mark)

10 Write down the exact value of tan (0)

(1 mark)

11 Write down the exact value of sin (90°)

(1 mark)

12 Write down the exact value of cos (45)

(1 mark)

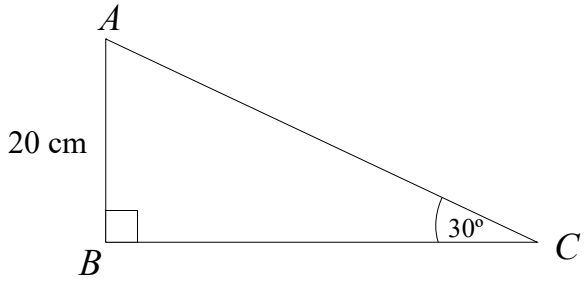
13 Write down the exact value of tan (60°)

(1 mark)

14 Write down the exact value of cos (30°)

(1 mark)

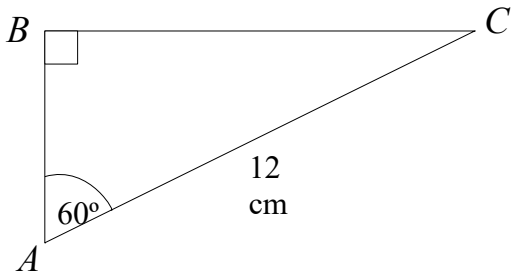
15



Calculate the length AC.

(3 marks)

16



Calculate the length AB.

(3 marks)

Name: _____

GCSE (1 – 9)

Vectors

Instructions

• Use **black** ink or ball-point pen.
• Answer all questions.
• Answer the questions in the spaces provided
– *there may be more space than you need.*
• Diagrams are **NOT** accurately drawn, unless otherwise indicated.
• You must **show all your working out.**

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

1 $\boldsymbol{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$

(a) Write down as a column vector

(i) **a** + **b**

…….....

(1)

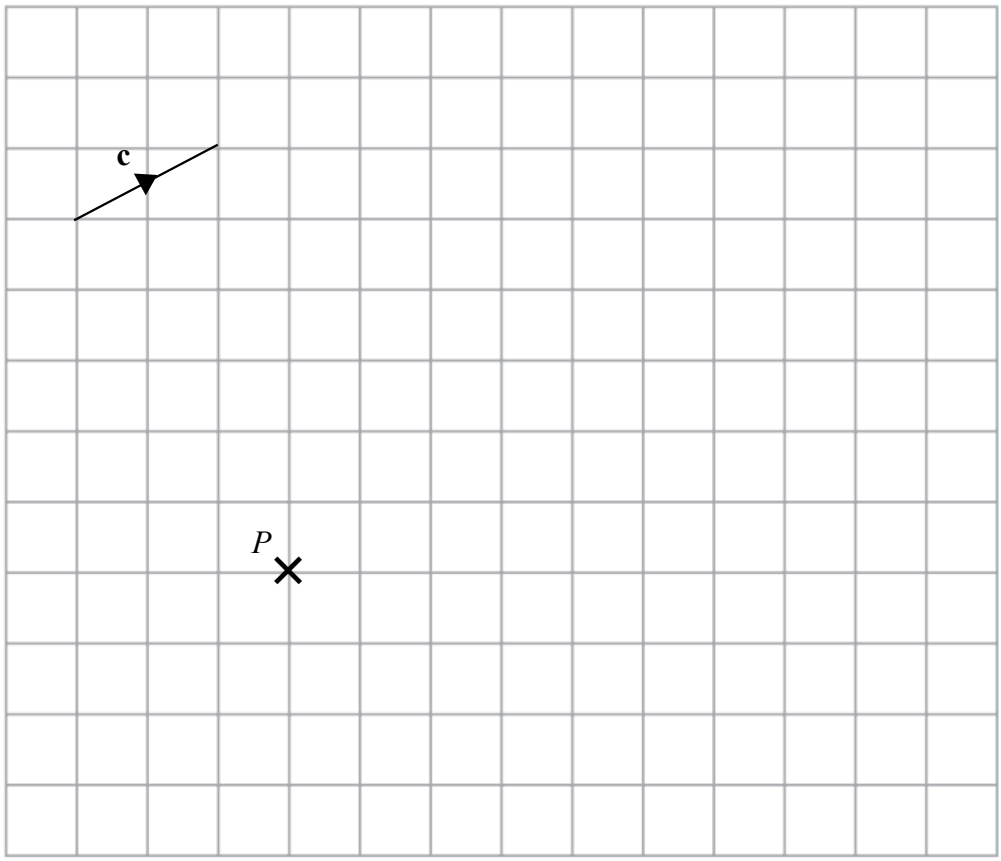
(ii) 2**a** + 3**b**

…….....

(2)

The vector **c** is drawn on the grid.

(b) From the point *P*, draw the vector 4**c**



(1)

(Total for question 1 is 4 marks)

2 $\boldsymbol{a} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

(a) Write down as a column vector

(i) $\mathbf{a} + \mathbf{b}$

…….....

(1)

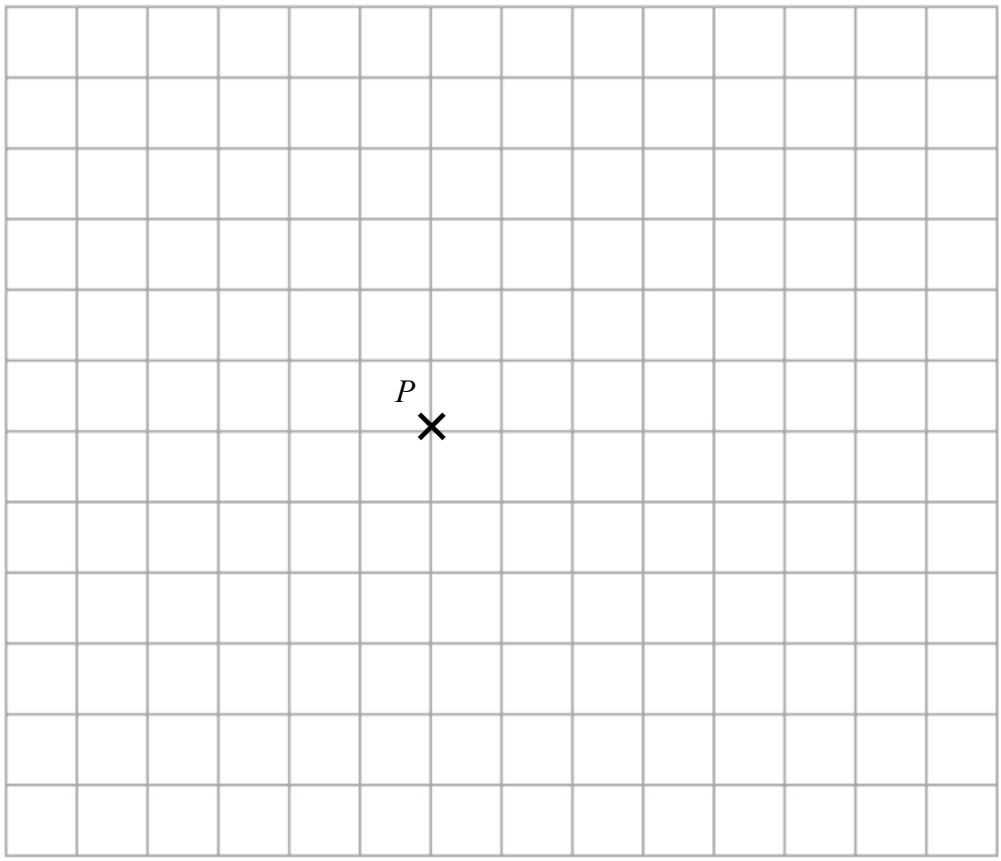
(ii) $2\mathbf{a} - \mathbf{b}$

…….....

(2)

$\boldsymbol{c} = \begin{pmatrix} 5 \\ -4 \end{pmatrix}$

(b) From the point P, draw the vector $\mathbf{c}$



(1)

(Total for question 2 is 4 marks)

3 $\boldsymbol{a} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$

(a) Write down as a column vector

(i) **a** + **b**

.....

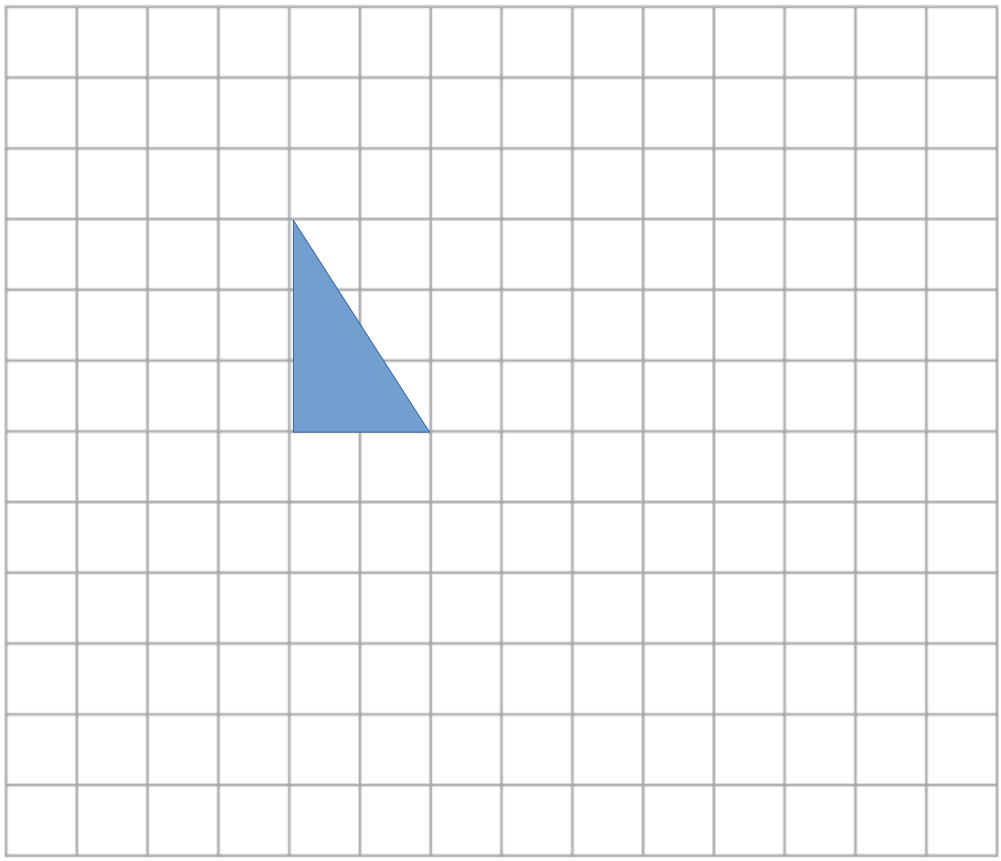
(1)

(ii) 2**a** – **b**

.....

(2)

(b) Translate the triangle by the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$



(1)

(Total for question 3 is 4 marks)

27 $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

Work out $3\mathbf{a} + \mathbf{b}$ as a column vector.

$\begin{pmatrix} \ldots\ldots\ldots \\ \ldots\ldots\ldots \end{pmatrix}$

(Total for Question 27 is 2 marks)

1 Tina has two bags of counters, Bag A and Bag B.

There are 5 red counters and 3 blue counters in bag A.
There are 4 red counters and 5 blue counters in bag B.

Tina takes at random a counter from each bag.

(a) Draw a probability tree to represent this information (2)

(b) Work out the probability that Tina takes two blue counters. (2)

(Total for question 1 is 4 marks)

2 Hannah is going to play one game of chess and one game of backgammon.

The probability she will win the game of chess is 0.6
The probability she will win the game of backgammon is 0.7.

(a) Draw a probability tree to represent this information (2)

(b) Work out the probability that Hannah will win both games. (2)

(Total for question 2 is 4 marks)

3 Rachel has two bags.

In the first bag there are 4 red balls and 6 green balls.
In the second bag there are 3 red balls and 5 green balls.

Rachel takes at random a ball from the first bag.
She then takes at random a ball from the second bag.

(a) Draw a probability tree to represent this information (2)

(b) Work out the probability that Rachel takes two green balls. (2)

(Total for question 3 is 4 marks)

4 Jo is going to play one tennis match and match of squash.

The probability she will win the tennis match is $\frac{4}{5}$

The probability she will win the squash match is $\frac{7}{10}$

(a) Draw a probability tree to represent this information (2)

(b) Work out the probability that Jo will win both matches. (2)

(Total for question 4 is 4 marks)

5 Each day Paul wears either a black tie or a red tie to work.

On any day the probability he wears a black tie is $\frac{5}{9}$

(a) Draw a probability tree for Monday and Tuesday.

(2)

(b) Work out the probability Paul wears different coloured ties on Monday and Tuesday .

(2)

(Total for question 5 is 4 marks)

6 Jon plays a game where he can win, draw or lose.

The probability Jon wins any game 0.5.
The probability Jon draws any game is 0.3

Jon plays two games.

(a) Draw a probability tree to represent this information (2)

(b) Work out the probability Jon wins both games. (2)

(Total for question 6 is 4 marks)

7 Bradley gets the bus on Saturday and Sunday.
The probability that Bradley's bus will be late on any day is 0.2

(a) Draw a probability tree to represent this information (2)

(b) Work out the probability that Bradley's bus is late on at least one of these days.

(2)

(Total for question 7 is 4 marks)

Workings Out Page

Workings Out Page

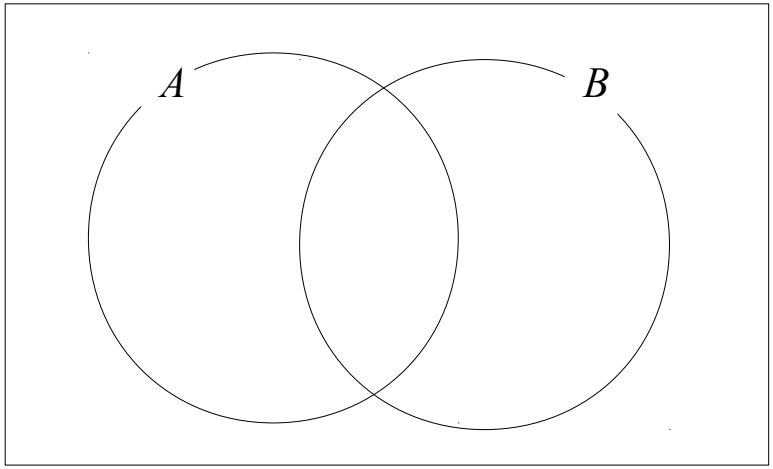
Workings Out Page

Workings Out Page

1 Given that $P(A) = 0.9$, find $P(A')$

(Total for question 1 is 1 mark)

For each of the following questions draw the Venn Diagram below



2 Shade the region that represents $(A \cap B)$

(1 mark)

3 Shade the region that represents $(A \cup B)$

(1 mark)

4 Shade the region that represents $(A' \cap B')$

(1 mark)

5 Shade the region that represents $(A' \cup B)$

(1 mark)

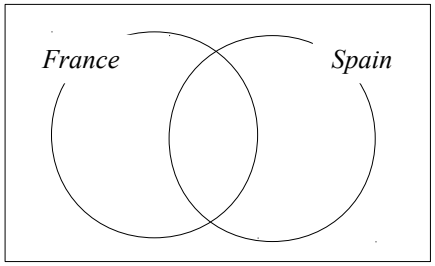
6 Shade the region that represents $(A \cap B')$

(1 mark)

7 40 students were surveyed:

20 have visited France
15 have visited Spain
10 have visited both France and Spain

Use this information to complete the Venn Diagram

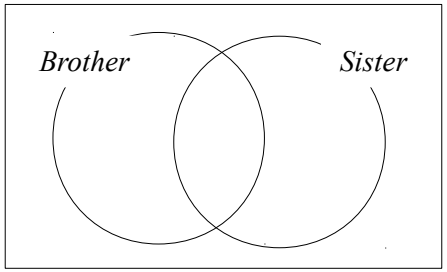


(Total for question 7 is 3 marks)

8 Out of 50 people surveyed:

30 have a brother
25 have a sister
6 have neither a brother or a sister

Use this information to complete the Venn Diagram



(Total for question 8 is 3 marks)

9 Sami asked 50 people which drinks they liked from tea, coffee and milk.

All 50 people like at least one of the drinks
19 people like all three drinks.
16 people like tea and coffee but do not like milk.
21 people like coffee and milk.
24 people like tea and milk.
40 people like coffee.
1 person likes only milk.

Sami selects at random one of the 50 people.

Work out the probability that this person likes tea.

(Total for question 9 is 4 marks)

10 Sami asked 60 people which sports they liked from rugby, football and cricket.

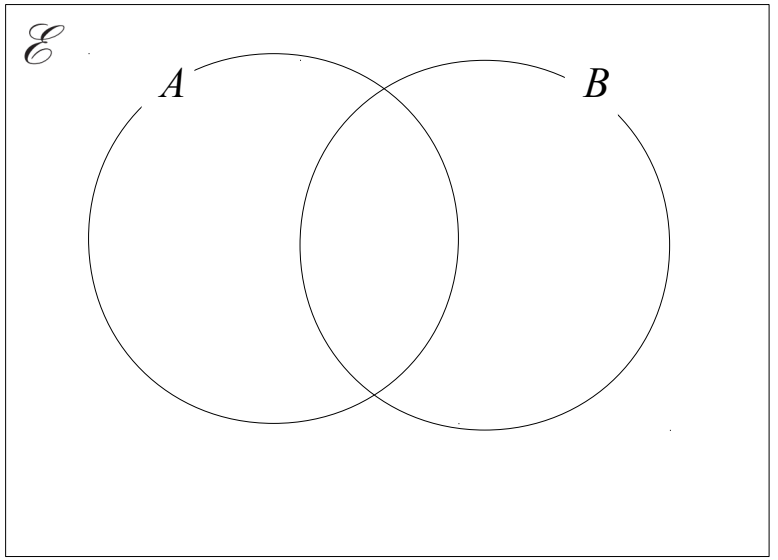
8 people like all three sports.
17 people like rugby and football.
13 people like football and cricket.
19 people like rugby and cricket.
35 people like football.
27 people like cricket
30 people like rugby.

How many people liked neither rugby or football or cricket?

(Total for question 10 is 4 marks)

11 $\mathscr{E}$ = {even numbers between 1 and 31}
A = {2, 4, 8, 14, 18, 22, 28}
B = {8, 10, 16, 18, 22, 30}

(a) Complete the Venn diagram to represent this information.



(4)

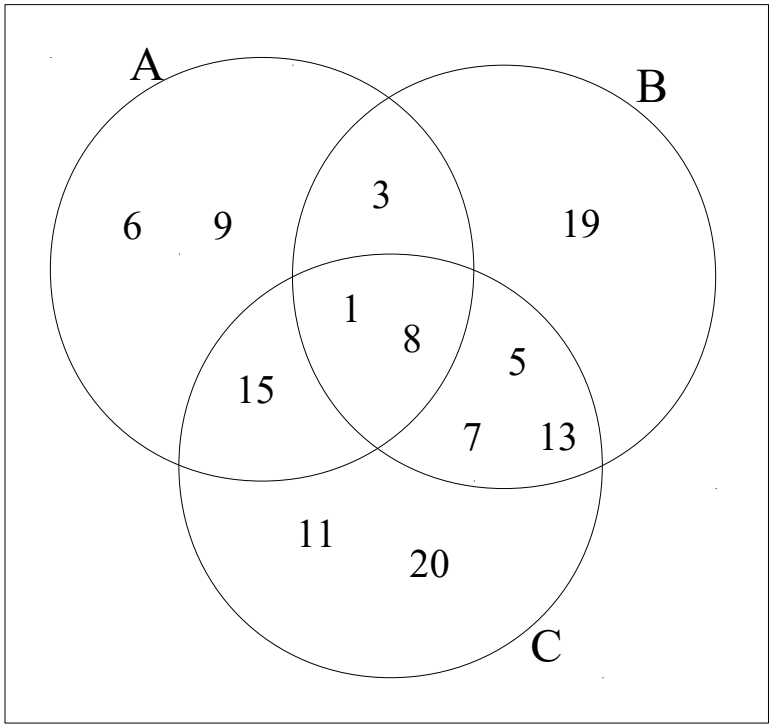
A number is chosen at random from the universal set, $\mathscr{E}$

(b) What is the probability that the number is in the set $A \cup B$?

(2)

(Total for question 11 is 6 marks)

12 Here is a Venn diagram.



(a) List the members of A ∩ B

(1)

A number is chosen at random from $\mathscr{E}$.

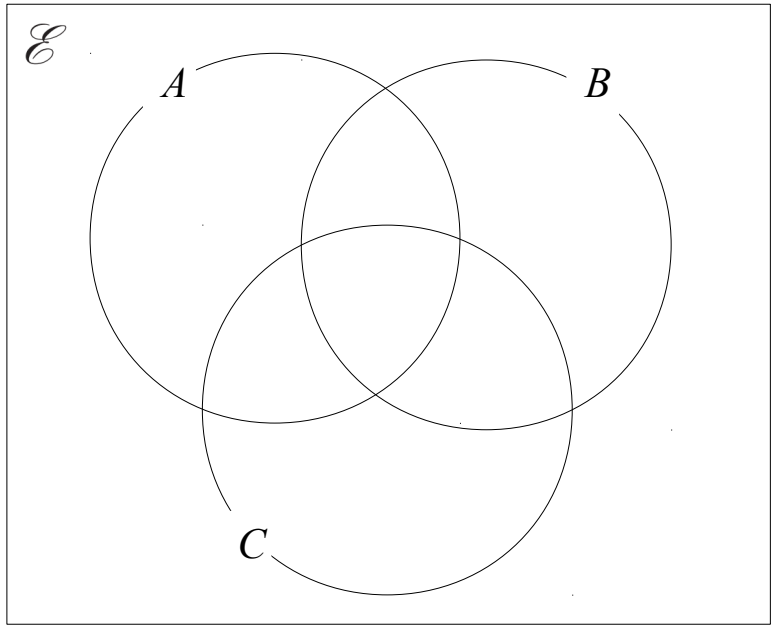
(b) Find $P(B \cup C)$

(2)

(Total for question 12 is 3 marks)

13 $\mathscr{E}$ = {odd numbers less than 30}
A = {1, 5, 7, 23, 29}
B = {7, 11, 15, 29}
C = {7, 15, 17, 19, 25, 27}

(a) Complete the Venn diagram to represent this information.



A number is chosen at random from $\mathscr{E}$.

(b) Find the probability that the number is a member of $(A \cap B)$.

(Total for question 26 is 3 marks)

Workings Out Page