KS3 Mathematics Homework

Pack F: Level 8

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1 Using a calculator (powers, roots and memory)

Use your calculator to find the answers. Show your calculator keys. Give your answer correct to six significant figures where appropriate.

1 5.2^2 1..... ☐

2 $\sqrt{38.2}$ 2..... ☐

3 1.89^6 3..... ☐

4 $\sqrt[3]{873}$ 4..... ☐

5 $\sqrt[5]{723}$ 5..... ☐

6 $27^{-\frac{1}{4}}$ 6..... ☐

7 $1.6^{-\frac{2}{3}}$ 7..... ☐

8 $\sqrt{2.7^3}$ 8..... ☐

9 10^{-3} 9..... ☐

10 $(-4)^3$ 10..... ☐

11 $y = 3x^4 + 2x^3 - 6x^2$

Calculate the value of y when x = 1.29.

Use an efficient calculator method.

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11..... ☐

12 $y = 4x^5 - 3x^4 - 2x^3 + 8$

Calculate the value of y when x = –1.71.

Use an efficient calculator method.

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12..... ☐

Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

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2 Standard form

Write the following numbers in standard form:

1	7420	1.....
2	538	2.....
3	0.0732	3.....
4	681.4	4.....
5	0.0006	5.....
6	0.0403	6.....
7	630 000 000	7.....
8	0.0000728	8.....

Write the following as ordinary numbers:

9	3.6×10^{3}	9.....
10	7.28×10^{5}	10.....
11	1.54×10^{4}	11.....
12	8.87×10^{-2}	12.....
13	3.72×10^{-1}	13.....
14	8.4×10^{-5}	14.....
15	6.1×10^{-3}	15.....
16	5.43×10^{4}	16.....

Give the answers to the following:

a In standard form (correct to three significant figures).

b As an ordinary number (correct to six significant figures where appropriate). Show your calculator keys for question 17.

17 $\dfrac{3.2 \times 10^{7}}{8.5 \times 10^{3}}$ ☐☐☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐☐☐ 17a ..... 17b.....

18 $(8.8 \times 10^{-2})^{3}$ 18a ..... 18b.....

19 $4.852 \times 10^{-6} \times 3.68 \times 10^{4}$ 19a ..... 19b.....

20 $5.328 \times 10^{7} \times 2.63 \times 10^{3}$ 20a ..... 20b.....

Minimum mark	19	16	12	8	
Circle grade	A	B	C	D	E

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3 Percentages and fractions – 1

1	Find $\frac{3}{8}$ of 28	1.....	☐
2	Find 17% of 80	2.....	☐
3	Increase 20 by $\frac{3}{16}$	3.....	☐
4	Increase 24 by 8%	4.....	☐
5	Increase 6 by 27%	5.....	☐
6	Decrease 30 by $\frac{2}{5}$	6.....	☐
7	Decrease 18 by 7%	7.....	☐
8	Decrease 35 by 76%	8.....	☐
9	Find $\frac{7}{20}$ of 18	9.....	☐
10	Increase 23 by 19%	10.....	☐
11	Decrease 86 by 72%	11.....	☐
12	Decrease 4.3 by 56%	12.....	☐
13	Find 18% of 7	13.....	☐
14	Increase 7.2 by 18%	14.....	☐
15	Decrease 6.8 by 24%	15.....	☐
16	Increase 0.27 by 72%	16.....	☐
17	Increase 28.3 by 16%	17.....	☐
18	Find 6% of 23	18.....	☐
19	Decrease 5.07 by 7%	19.....	☐
20	Increase 6.32 by 8%	20.....	☐

Minimum mark	16	13	10	7		20
Circle grade	A	B	C	D	E	

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4 Percentages and fractions – 2

1 The normal price of a car is £18 000. In a sale the price is reduced by 8%. What is the sale price of the car?

1 £ ..... ☐

2 An estate agent receives a $2\frac{1}{2}$% commission on the sale of a house. If the house sells for £64 000, how much commission will she receive?

2 £ ..... ☐

3 A box of Christmas cards is sold for £2.80. $\frac{3}{8}$ of the selling price is given to charity. How much is given to charity?

3 £ ..... ☐

4 The bill for a car repair is £28.40. The garage offers a 15% discount if the bill is paid immediately. Mr Evans pays immediately. How much does he pay?

4 £ ..... ☐

5 Mr Green earned £220 a week. Calculate his new wage if he receives a pay rise of:

a 3% 5a £ ..... ☐

b 2.5% 5b £ ..... ☐

c 11% 5c £ ..... ☐

6 In a sale the following items are reduced by 12%. Calculate the sale prices:

a Shirt, normal price £18 6a £ ..... ☐

b Trousers, normal price £22 6b £ ..... ☐

c Hat, normal price £7 6c £ ..... ☐

d Dress, normal price £16.50 6d £ ..... ☐

e Scarf, normal price £8.50 6e £ ..... ☐

Minimum mark	10	8	6	4	
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5 Percentages and fractions – 3

1 The price of a meal including a 15% service charge was £9.66. How much was the price of the meal before the service charge was added?

1 £ ..... ☐

2 The price of a car including 17.5% VAT was £20 445. What was the price before the VAT was added?

2 £ ..... ☐

3 A dress was reduced in price by 30% in a sale. The sale price was £18.90. What was the original price?

3 £ ..... ☐

4 A man received a wage increase of 7%. His wage after the increase was £398.04. What was his wage before the increase?

4 £ ..... ☐

5 A TV cost £493.50 including 17.5% VAT. How much was the VAT?

5 £ ..... ☐

6 A picture was sold by a dealer for £728. He made a profit of 12%. How much profit did he make?

6 £ ..... ☐

7 Mrs Walker sold a table for £100. She made a loss of $\frac{1}{5}$ by selling at this price. How much money did she lose?

7 £ ..... ☐

8 The price of a car increased by 5%. The new price of the car was £21 000. What was the price of the car before the increase?

8 £ ..... ☐

Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

8

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6 Percentages and fractions – 4

1 A woman earns £30 000 per annum. She receives a 4% increase each year. What is her annual salary in three years?

1 £ ..... ☐

2 A man earns £500 per week. He receives a 6% increase each year. What is his weekly wage in three years? Give your answer to the nearest penny.

2 £ ..... ☐

3 The population of a country is rising by 3% per annum. In 1996 the population was 8 400 000. What was the population in:

a 1998?

3a ..... ☐

b 1999? Give your answer to the nearest whole number.

3b..... ☐

4 The value of a car decreased by 8% each year. The value in 1998 was £12 000.

a What was the value in 1999?

4a £ ..... ☐

b What will be the value in 2001? Give your answer to the nearest penny.

4b £ ..... ☐

5 A man's salary increased by 2.5% per annum. In 1992 he earned £15 000. How much did he earn in 1995? Give your answer to the nearest penny.

5 £ ..... ☐

6 A man invests £6000 at 7% per annum compound interest. What is the value of his investment after three years? Give your answer to the nearest penny.

6 £ ..... ☐

Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

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7 Using algebraic formula – 1

In each question write the value of y correct to six significant figures where appropriate, given $a = \frac{3}{5}$, $b = -\frac{5}{6}$, $c = 3.872$, $d = -2.617$.

Evaluate the following:

1 $y = 3a + 4b$ 1..... ☐

2 $y = a(b - 3c)$ 2..... ☐

3 $y = \dfrac{6a - 4b}{a - b}$ 3..... ☐

4 $y = a\sqrt{(bd)}$ 4..... ☐

5 $y = \dfrac{a + b + c}{3d + c}$ 5..... ☐

6 $y = \sqrt{\left(\dfrac{a - 3b}{c^2}\right)}$ 6..... ☐

7 $y = \sqrt{a} + \sqrt{c}$ 7..... ☐

8 $y = \dfrac{a^2 + b^2}{c^2}$ 8..... ☐

9 $y = a^3b^2$ 9..... ☐

10 $y = c - 2b(a - b)$ 10..... ☐

11 $y = d - 2b(c + d)$ 11..... ☐

12 $y = d^3 - a^3$ 12..... ☐

Minimum mark	10	8	6	4	
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8 Using algebraic formula – 2

The volume of a cone is given by the formula $V = \frac{1}{3}\pi r^2 h$. Give all answers correct to three significant figures. Calculate V given:

1 r = 4 cm, h = 3 cm — 1 .....cm^3 ☐

2 r = 7 cm, h = 4 cm — 2 .....cm^3 ☐

3 r = 3.5 cm, h = 2.8 cm — 3 .....cm^3 ☐

4 r = 1.3 m, h = 1.2 m — 4 .....cm^3 ☐

Calculate h given:

5 V = 27 cm^3, r = 4 cm — 5 .....cm ☐

6 V = 33 cm^3, r = 5 cm — 6 .....cm ☐

7 V = 32.5 cm^3, r = 3 cm — 7 .....cm ☐

8 V = 17.2 m^3, r = 6.1 m — 8 .....cm ☐

Calculate r given:

9 V = 32 m^3, h = 5.4 m — 9 .....cm ☐

10 V = 84 m^3, h = 7.3 m — 10 .....cm ☐

11 V = 17.2 cm^3, h = 6.2 cm — 11 .....cm ☐

12 V = 23.5 cm^3, h = 5.3 cm — 12 .....cm ☐

Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

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9 Re-writing formulae – 1

In each question make A the subject:

1	$B = C + A$	1 A= ..... ☐
2	$C = A - B$	2 A= ..... ☐
3	$B = C - A$	3 A= ..... ☐
4	$B = 3C + 2A$	4 A= ..... ☐
5	$C = 3C - 4A$	5 A= ..... ☐
6	$C = ABD$	6 A= ..... ☐
7	$CD = AB$	7 A= ..... ☐
8	$3C = 2A$	8 A= ..... ☐
9	$4CD = 3A + B$	9 A= ..... ☐
10	$5D = 4B - 3AC$	10 A= ..... ☐
11	$D = \frac{A}{B}$	11 A= ..... ☐
12	$D = \frac{B}{A}$	12 A= ..... ☐
13	$C = \frac{AB}{D}$	13 A= ..... ☐
14	$3C = \frac{BD}{AE}$	14 A= ..... ☐
15	$C = \frac{A}{B} + 3$	15 A= ..... ☐
16	$C = \frac{B}{A} - 2C$	16 A= ..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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10 Re-writing formulae – 2

In each question make C the subject:

1 $\sqrt{C} = A$ 1 C=..... ☐

2 $C^2 = A$ 2 C=..... ☐

3 $B = \sqrt{(C + A)}$ 3 C=..... ☐

4 $A = 8C^2$ 4 C=..... ☐

5 $\sqrt{A} = \sqrt{C}$ 5 C=..... ☐

6 $A = D + \sqrt{C}$ 6 C=..... ☐

7 $B = \frac{\sqrt{C}}{AD}$ 7 C=..... ☐

8 $D = AC^2$ 8 C=..... ☐

9 $AB = (CD)^2$ 9 C=..... ☐

10 $A = B + C^2$ 10 C=..... ☐

11 $A = B - C^2$ 11 C=..... ☐

12 $BD = A\sqrt{C}$ 12 C=..... ☐

13 $B = A(C + D)$ 13 C=..... ☐

14 $B = C(A + D)$ 14 C=..... ☐

15 $B = \frac{D}{C + E}$ 15 C=..... ☐

16 $B = \frac{C + D}{E}$ 16 C=..... ☐

Minimum mark	13	11	8	5	
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11 Equations – 1

Find the value of y in each equation:

1 $y + 13 = 7$ 1 y=..... ☐

2 $y - 8 = 3$ 2 y=..... ☐

3 $3y = -12$ 3 y=..... ☐

4 $-2y = -6$ 4 y=..... ☐

5 $-4y = 2$ 5 y=..... ☐

6 $7y - 6 = 5y - 14$ 6 y=..... ☐

7 $5y - 8 = 9y + 6$ 7 y=..... ☐

8 $\frac{y}{6} = 3$ 8 y=..... ☐

9 $\frac{y}{4} = -6$ 9 y=..... ☐

10 $\frac{3y}{2} = 12$ 10 y=..... ☐

11 $\frac{2y + 3}{4} = 5$ 11 y=..... ☐

12 $\frac{4y - 2}{5} = 8$ 12 y=..... ☐

13 $\frac{3}{y} = 12$ 13 y=..... ☐

14 $\frac{4}{y} = -8$ 14 y=..... ☐

15 $\frac{3}{2y} = 12$ 15 y=..... ☐

16 $\frac{5}{4y} = -20$ 16 y=..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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12 Equations – 2

Find the value of a, correct to three significant figures where appropriate.

1 $a^2 = 8$ — 1 a= ..... ☐

2 $\sqrt{a} = 3.21$ — 2 a= ..... ☐

3 $a^2 = 4.2$ — 3 a= ..... ☐

4 $8a^2 = 48$ — 4 a= ..... ☐

5 $4 = \frac{3}{a^2}$ — 5 a= ..... ☐

6 $6 = \frac{a^2}{4}$ — 6 a= ..... ☐

7 $28 = \sqrt{a}$ — 7 a= ..... ☐

8 $42 = 3 + \sqrt{a}$ — 8 a= ..... ☐

9 $4(a + 3) = 18$ — 9 a= ..... ☐

10 $3(a + 2) = 5(a - 1)$ — 10 a= ..... ☐

11 $6(a - 2) - 2(a + 3) = 8$ — 11 a= ..... ☐

12 $5(2a - 3) = 6$ — 12 a= ..... ☐

13 $4(a + 3) - 5(a - 1) = 2$ — 13 a= ..... ☐

14 $6(a + 3) = 0$ — 14 a= ..... ☐

15 $\frac{a + 2}{4} = 8$ — 15 a= ..... ☐

16 $\frac{a - 3}{5} = 10$ — 16 a= ..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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13 Indices (powers) – 1

Simplify:

1	$a^5 \times a^7$	1..... ☐
2	$c^3 \times c^4$	2..... ☐
3	$y^5 \times y$	3..... ☐
4	$y^8 \div y^2$	4..... ☐
5	$y^6 \div y$	5..... ☐
6	$(y^4)^5$	6..... ☐
7	$(a^3)^2$	7..... ☐
8	$a^6 \times a^{-4}$	8..... ☐
9	$a^{-3} \times a^{-2}$	9..... ☐
10	$a^8 \times \frac{1}{a^5}$	10..... ☐
11	$a^{-3} \div a^{-5}$	11..... ☐
12	$\frac{a^4}{a^6}$	12..... ☐
13	$c^3 \times c^2 \times c$	13..... ☐
14	$3c^2 + 5c^2$	14..... ☐
15	$8y^2 - 3y^2$	15..... ☐
16	$10a^3 - 4a^3$	16..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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14 Indices (powers) – 2

Simplify:

1	$6y^3 \times 2y^4$	1..... ☐
2	$3a^4 \times 2a$	2..... ☐
3	$5a^4c^2 \times 3a^3c^2d$	3..... ☐
4	$10a^8 \div 5a^4$	4..... ☐
5	$12a^6 \div 4a^4$	5..... ☐
6	$15a^5c^3 \div 5a^3c^2$	6..... ☐
7	$(3a^2)^2$	7..... ☐
8	$(5y^4)^2$	8..... ☐
9	$\frac{6y^3}{2y}$	9..... ☐
10	$\frac{8y^6}{4y^3}$	10..... ☐
11	$\frac{15y^8}{10y^{12}}$	11..... ☐
12	$\frac{20a^3b^2}{10ab}$	12..... ☐
13	$\frac{15a^4bc^3}{10ab^3}$	13..... ☐
14	$\frac{16xy^3z^4}{12x^4yz^2}$	14..... ☐
15	$(2a^2)^3$	15..... ☐
16	$2(a^2)^3$	16..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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15 Expansion of brackets – 1

Expand the following expressions:

1	$3(2a + 5)$	1..... ☐
2	$5(4a - 7)$	2..... ☐
3	$6(a + 4)$	3..... ☐
4	$a(3a + 5)$	4..... ☐
5	$4a(5a - 3)$	5..... ☐
6	$2y^2(3y^3+4y)$	6..... ☐
7	$6c^3(3c^2 + 2c + 1)$	7..... ☐
8	$ab(cd + e)$	8..... ☐
9	$(3a + 5)4$	9..... ☐
10	$(2a^2 - 3a)2$	10..... ☐
11	$a^2b^3c^4(a^3b - abc^2)$	11..... ☐
12	$a^6c^3(ac^2d + ac)$	12..... ☐
13	$3a^2c(2a + 3c)$	13..... ☐
14	$5ay\ (4y^2 - 3a)$	14..... ☐
15	$3a^2cy^3(2ac - 3y)$	15..... ☐
16	$6y^3z^2(2ay - 3z^3)$	16..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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16 Expansion of brackets – 2

Expand and simplify the following expressions:

1	$(a + 3)(a + 5)$	1 ..... ☐
2	$(y + 4)(y - 3)$	2 ..... ☐
3	$(c - 2)(c - 5)$	3 ..... ☐
4	$(a - 8)(a + 5)$	4 ..... ☐
5	$(2x + 5y)(3x + 6y)$	5 ..... ☐
6	$(5a - 3c)(2a - 2c)$	6 ..... ☐
7	$(3a + 4c)(2a - 3c)$	7 ..... ☐
8	$(3a - 2c) + (4a - 8c)$	8 ..... ☐
9	$(4a + 3c) - (2a + 4c)$	9 ..... ☐
10	$8c - 3(5a - 3c)$	10 ..... ☐
11	$8c - 2(4a + 2c)$	11 ..... ☐
12	$6a - 3(a - 4)$	12 ..... ☐
13	$a^2 - a(3a + y)$	13 ..... ☐
14	$(a - c)^2$	14 ..... ☐
15	$(2a - 3y)^2$	15 ..... ☐
16	$(3a + 4c)^2$	16 ..... ☐

Minimum mark	13	11	8	5	
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17 Factorisation – 1

Factorise:

1	$6a + 3$	1	☐
2	$5y + 15$	2	☐
3	$7c - 14$	3	☐
4	$12x - 6$	4	☐
5	$8x^2 - 14x$	5	☐
6	$3a^2 - 6a$	6	☐
7	$10c^2 - 5c$	7	☐
8	$12c - 14d + 18e$	8	☐
9	$8a^4 + 7a^3 - 6a^2$	9	☐
10	$15c^3 - 10c^2$	10	☐
11	$16d^5 - 12d^3$	11	☐
12	$20y^8 - 16y^6 + 12y^5$	12	☐
13	$a^2c^3 - a^2c + a^2d$	13	☐
14	$6a^3bc - 12a^2b^2 + 18a^3b$	14	☐
15	$12abc^3 + 8a^2bd$	15	☐
16	$18a^3cd - 12abc^2$	16	☐

Minimum mark	13	11	8	5	
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18 Factorisation – 2

Factorise:

1	$a^2 + 6a + 8$	1 (.....)(.....) ☐
2	$a^2 + 7a + 6$	2 (.....)(.....) ☐
3	$a^2 - 2a - 15$	3 (.....)(.....) ☐
4	$a^2 + 9a + 14$	4 (.....)(.....) ☐
5	$x^2 - 7x + 10$	5 (.....)(.....) ☐
6	$x^2 + 2x - 15$	6 (.....)(.....) ☐
7	$x^2 - 9x + 8$	7 (.....)(.....) ☐
8	$x^2 - 3x - 40$	8 (.....)(.....) ☐
9	$y^2 - 9y + 20$	9 (.....)(.....) ☐
10	$y^2 + 13y + 42$	10 (.....)(.....) ☐
11	$y^2 - y - 90$	11 (.....)(.....) ☐
12	$a^2 - b^2$	12 (.....)(.....) ☐

Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

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19 Solving quadratic equations by factorisation

Solve the following quadratic equations by factorisation:

1 $x^2 - 8x + 15 = 0$

1 x= ..... ☐

x= ..... ☐

2 $a^2 - 3a + 2 = 0$

2 a= ..... ☐

a= ..... ☐

3 $y^2 - 7y + 12 = 0$

3 y= ..... ☐

y= ..... ☐

4 $c^2 + 3c - 10 = 0$

4 c= ..... ☐

c= ..... ☐

5 $x^2 + 8x + 15 = 0$

5 x= ..... ☐

x= ..... ☐

6 $y^2 - 2y - 8 = 0$

6 y= ..... ☐

y= ..... ☐

7 $a^2 + 4a + 3 = 0$

7 a= ..... ☐

a= ..... ☐

8 $(x + 1)(x - 6) = 0$

8 x= ..... ☐

x= ..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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20 Inequalities

Solve the following inequalities:

1 $x^2 > 64$ 1..... ☐

2 $y^2 < 81$ 2..... ☐

3 $8 \leq 4x < 20$ 3..... ☐

4 $13 \leq 3x - 2 \leq 31$ 4..... ☐

5 $-8 \leq 2x + 2 < -2$ 5..... ☐

6 $-23 < 3y - 5 < 7$ 6..... ☐

7 x is an integer. Write down all of the possible values of x.
$4 \leq 3x - 2 < 13$ 7..... ☐

8 y is an integer. Write down all of the possible values of y.
$-12 \leq 5y - 2 < 7$ 8..... ☐

Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

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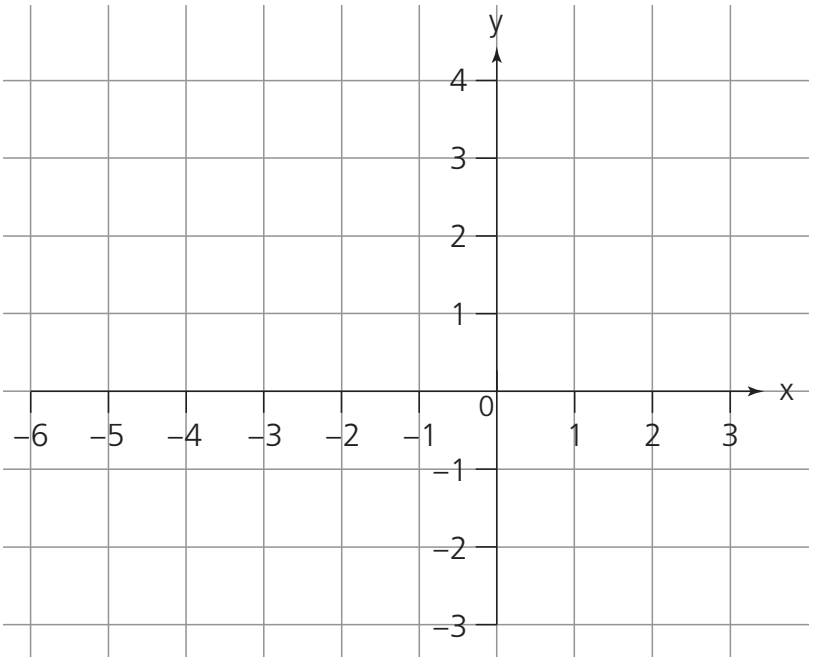
21 The straight line equation y = mx + c

1 Find: a The gradient, b The equation of the line which passes through (–1, –3) and (2, 3).

2 Find: a The gradient, b The equation of the line which passes through (–6, 4) and (3, 1).



1a ..... ☐

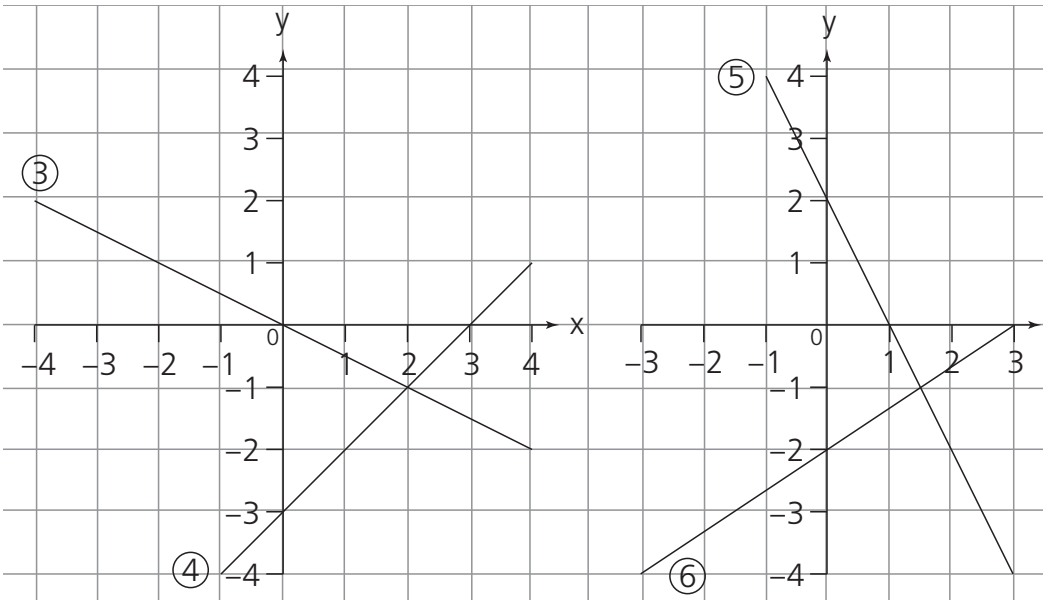
b y=..... ☐

2a ..... ☐

b y=..... ☐

a What are the gradients of the four lines shown below?

b What are the equations of the four lines shown below?



3a ..... ☐

b y=..... ☐

4a ..... ☐

b y=..... ☐

5a ..... ☐

b y=..... ☐

6a ..... ☐

b y=..... ☐

Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

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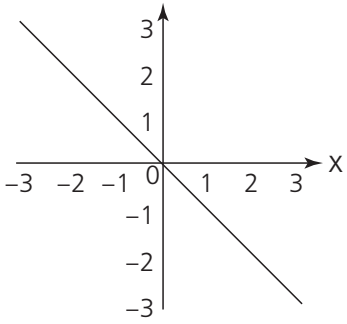
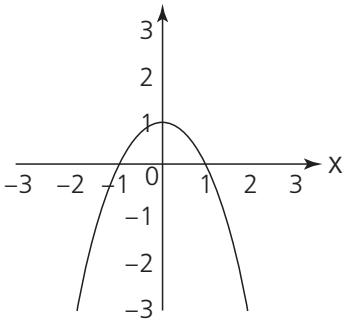
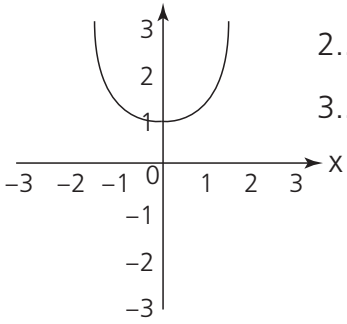
22 Drawing graphs

Label the following graphs using the **letters** shown below:

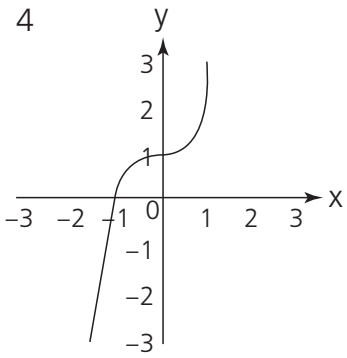
a $y = x$	d $y = -x$	g $y = x^2$	j $y = -x^2$	m $y = x^3 + 1$
b $y = x + 1$	e $y = -x + 1$	h $y = x^2 + 1$	k $y = -x^2 + 1$	n $y = -x^3 + 1$
c $y = x - 2$	f $y = -x - 2$	i $y = x^2 - 1$	l $y = -x^2 - 1$	o $y = \frac{1}{x}$

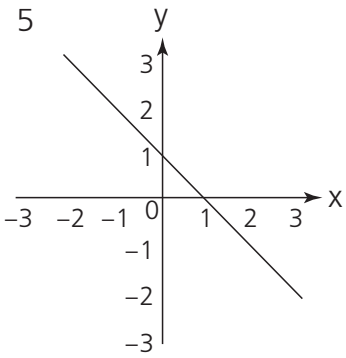
1 

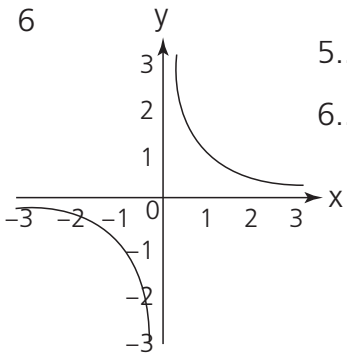
2 

3 

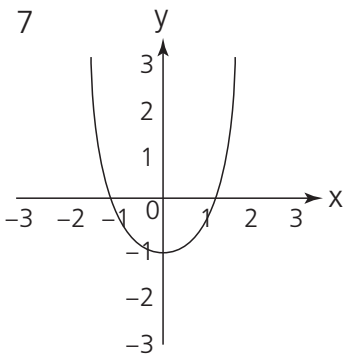
1..... ☐
2..... ☐
3..... ☐

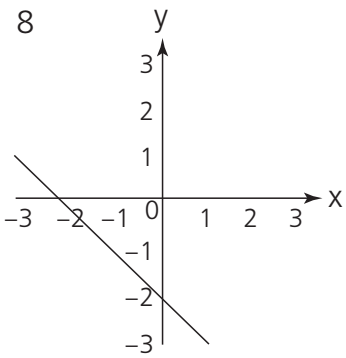
4 

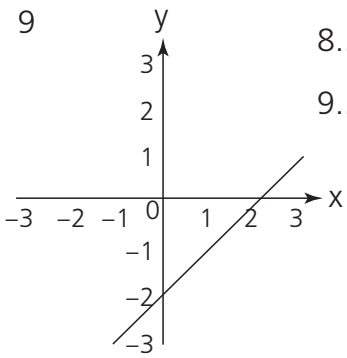
5 

6 

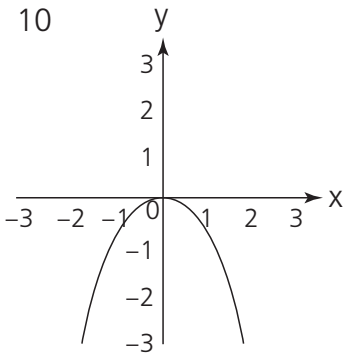
4..... ☐
5..... ☐
6..... ☐

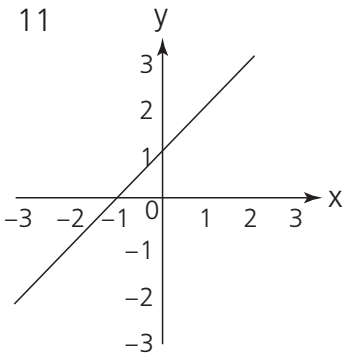
7 

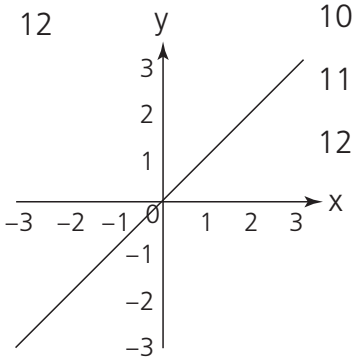
8 

9 

7..... ☐
8..... ☐
9..... ☐

10 

11 

12 

10..... ☐
11..... ☐
12..... ☐

Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

12

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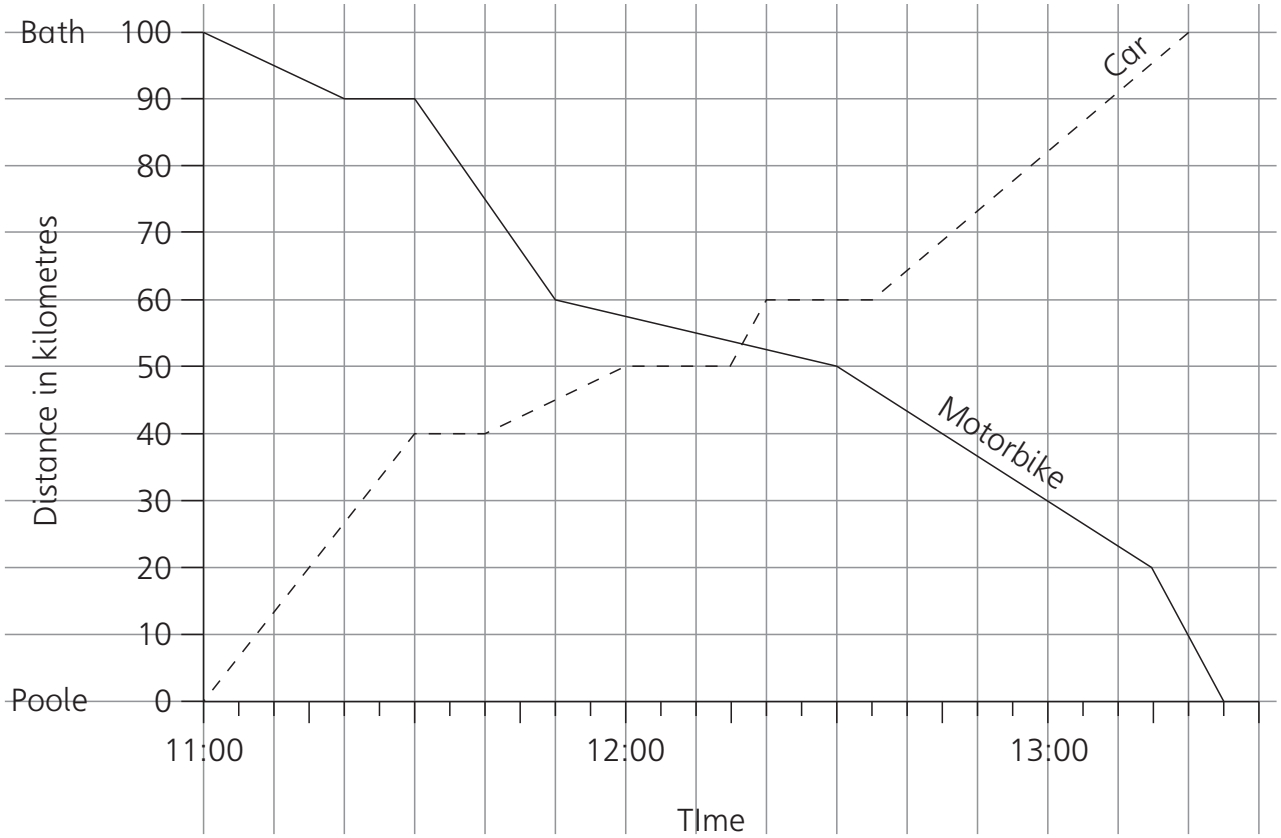
23 Speed, time and distance graphs

This graph shows the journeys made by a car and a motorbike:



1 What time did the car leave Poole? 1.....

2 How many times did the car stop? 2.....

3 What time did the car arrive in Bath? 3.....

4 Between which times did the motorbike travel fastest? 4.....

5 What is the distance from Poole to Bath? 5.....

6 How far was the car from Bath at 11:30? 6.....

7 What time did the motorbike arrive in Poole? 7.....

8 What time did the car and motorbike pass each other? 8.....

9 What was the speed of the motorbike at:

a 11:15? 9a .....

b 13:00? b .....

10 What was the speed of the car at:

a 11:15? 10a .....

b 11:45? b .....

Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

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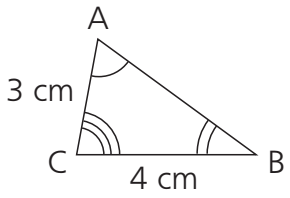
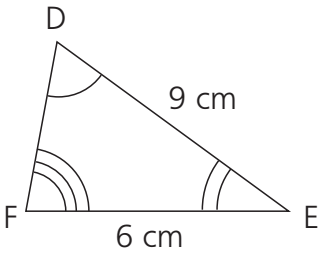
24 Similarity

1 Triangle ABC is similar to triangle DEF:



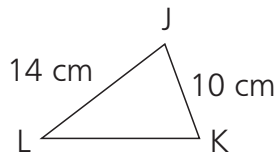


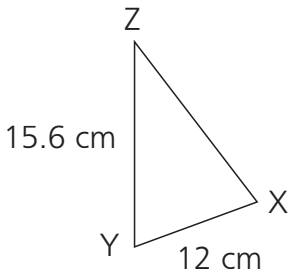
Calculate:

a AB 1a ..... ☐

b DF b..... ☐

2 Triangle JKL is similar to triangle XYZ:





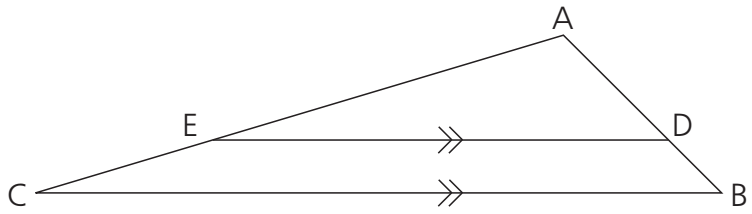
Calculate:

a KL 2a ..... ☐

b XZ b..... ☐

c Angle L is 43°. What is the size of angle Z? c..... ☐

3



DE is parallel to BC.
AB = 10 cm BD = 2 cm
AC = 28 cm BC = 36 cm

Calculate:

a AE 3a ..... ☐

b DE b..... ☐

c EC c..... ☐

Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

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25 Formulae for length, area and volume

a, b, c and d are lengths.

State whether each formula gives a length, area, volume or none of these.

1 $a + b + c$ 1..... ☐

2 $ab + 3c$ 2..... ☐

3 $3a + 5c$ 3..... ☐

4 $4abc - 2bcd$ 4..... ☐

5 $a^2 + bc + 3d$ 5..... ☐

6 $a^2 + bc + cd$ 6..... ☐

7 $6abc + 7b^2c$ 7..... ☐

8 $5a + \frac{cd}{e}$ 8..... ☐

9 $ab^2 + cd^2$ 9..... ☐

10 $abc + \frac{abc}{d}$ 10..... ☐

11 $a^2b - bc^2$ 11..... ☐

12 $\frac{a^3b}{d} + \frac{abcd}{c} + d^3$ 12..... ☐

13 $\frac{c^3}{d} + a^2 + 2bd$ 13..... ☐

14 $\frac{a^3c}{bd} + \frac{3ab}{c}$ 14..... ☐

15 $\frac{a^3c}{b} - \frac{abcd}{c}$ 15..... ☐

16 $\frac{3abc}{d} + \frac{c^2d}{b}$ 16..... ☐

Minimum mark	13	11	8	5	
Circle grade	A	B	C	D	E

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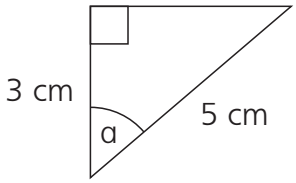
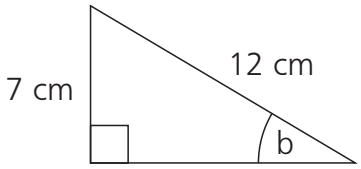
26 Trigonometry: Finding an angle

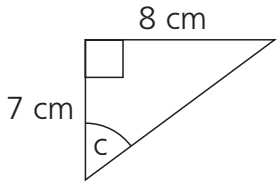
Calculate the size of the angles indicated.
Give your answer correct to three significant figures.

1 

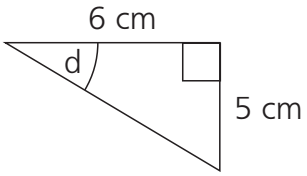
1 a= ..... ☐

2 

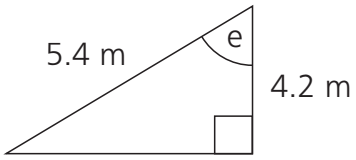
2 b= ..... ☐

3 

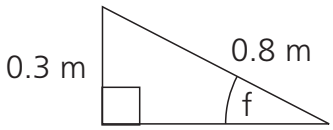
3 c= ..... ☐

4 

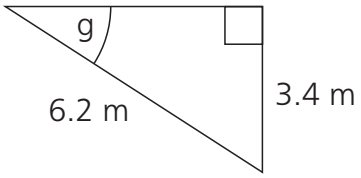
4 d= ..... ☐

5 

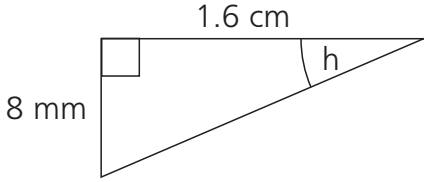
5 e= ..... ☐

6 

6 f= ..... ☐

7 

7 g= ..... ☐

8 

8 h= ..... ☐

Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

8

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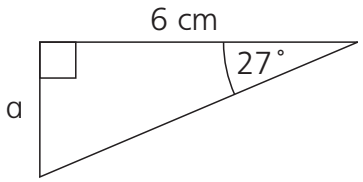
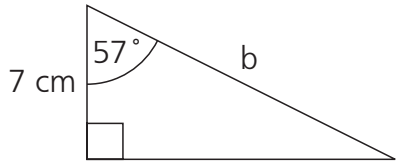
27 Trigonometry: Finding a side

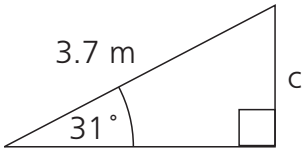
Find the size of the sides indicated.
Give your answer correct to three significant figures.

1 

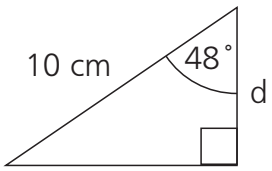
1..... ☐

2 

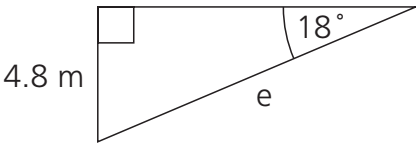
2..... ☐

3 

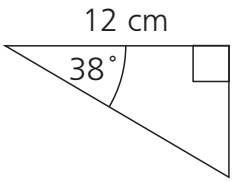
3..... ☐

4 

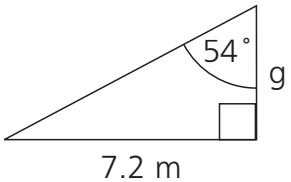
4..... ☐

5 

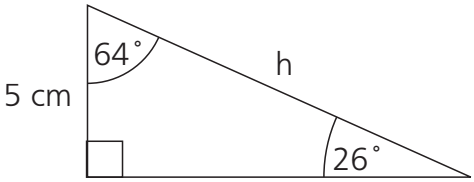
5..... ☐

6 

6..... ☐

7 

7..... ☐

8 

8..... ☐

Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

8

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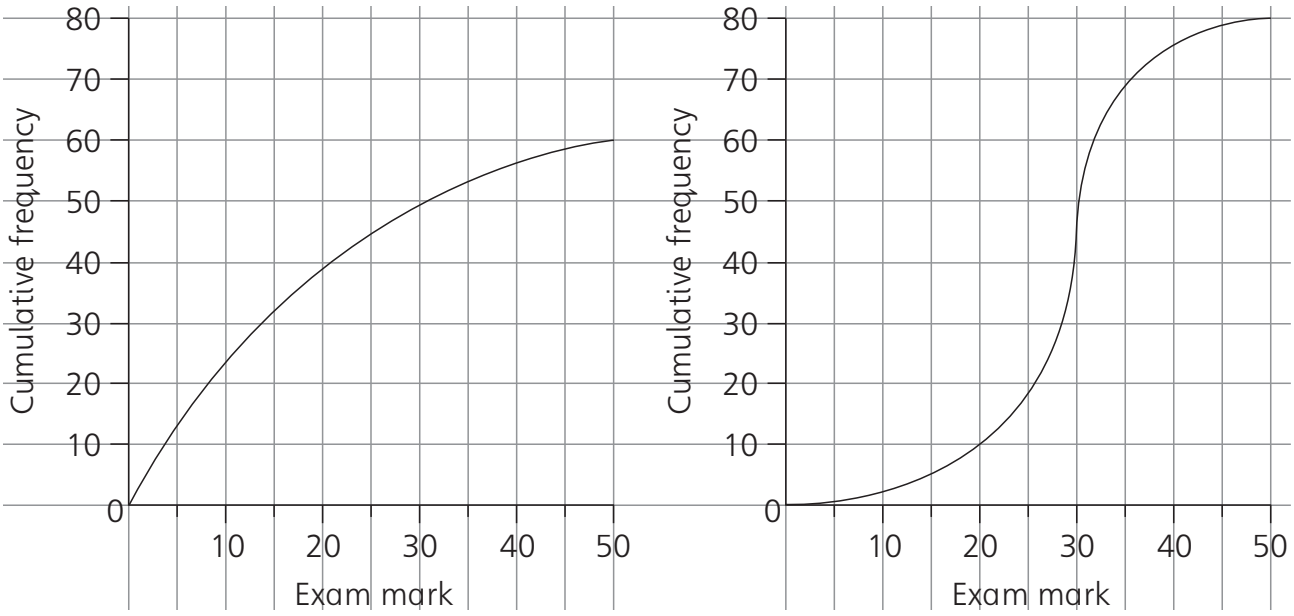
28 Using cumulative frequency diagrams to compare distributions

Pupils in two schools each took the same maths exam.
The results are shown in the cumulative frequency diagrams.



1 What is the median of:

a School A? 1a ..... ☐

b School B? b ..... ☐

2 What is the upper quartile of:

a School A? 2a ..... ☐

b School B? b ..... ☐

3 What is the lower quartile of:

a School A? 3a ..... ☐

b School B? b ..... ☐

4 What is the interquartile range of:

a School A? 4a ..... ☐

b School B? b ..... ☐

5 Use the median and interquartile range to compare School A and School B

Comparison .....

.....

.....

..... 2 marks for comparison ☐ ☐

Minimum mark	8	6	5	3	
Circle grade	A	B	C	D	E

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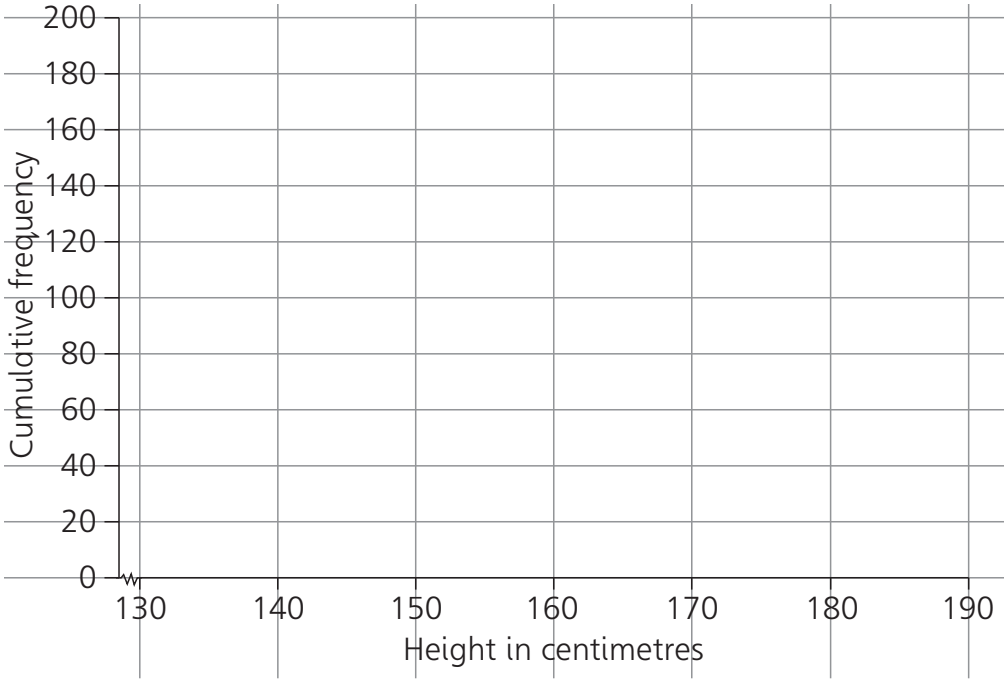
29 Cumulative frequency

This table shows the height of pupils, in centimetres, in a school:

Height in centimetres	Frequency	Cumulative frequency
130 – under 140	8	8
140 – under 150	16	24
150 – under 160	58	
160 – under 170	87	
170 – under 180	28	
180 – under 190	3	

1 Complete the cumulative frequency column.

2 Complete the cumulative frequency diagram.



Draw relevant lines on the diagram to show how you answered these questions:

3 What is the median? 3.....

4 What is the upper quartile? 4.....

5 What is the lower quartile? 5.....

6 What is the interquartile range? 6.....

7 How many pupils were over 175 cm? 7.....

Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

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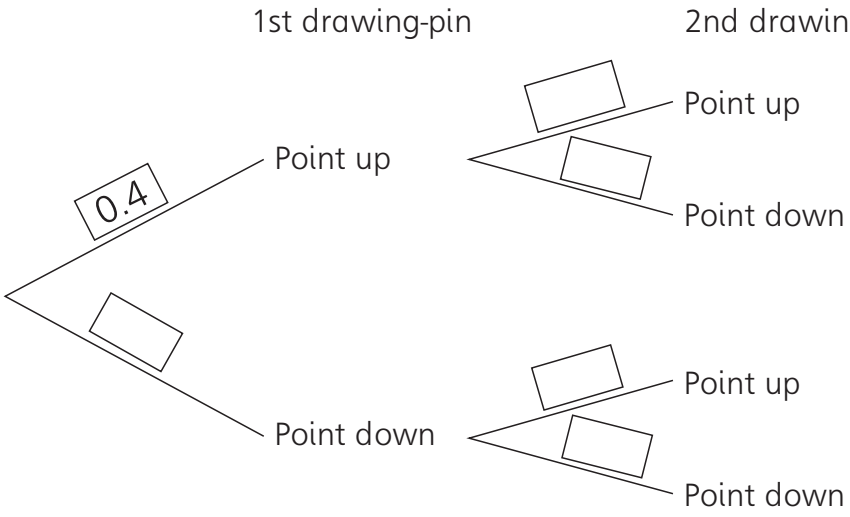
30 Probability

1 The probability of a drawing-pin landing point up is 0.4, the probability of landing point down is 0.6. Two drawing-pins are dropped. Complete the tree diagram to show this:



Use your tree diagram to answer the following questions:

a What is the probability of both drawing-pins landing:

i Point up? 1ai ..... ☐

ii Point down? aii ..... ☐

b What is the probability of at least one drawing-pin landing point up? b ..... ☐

2 The chance that a battery does not work is 0.02. What is the chance that the battery does work? 2..... ☐

3 Four coins are tossed. What is the probability of:

a Four heads? 3a ..... ☐

b Four tails? b ..... ☐

c At least one head? c..... ☐

d At least one tail? d ..... ☐

Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

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