KS3 Mathematics
Homework Pack F: Level 8

Stafford Burndred

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   $^3\sqrt{873}$ 4...................... ☐

5   $^5\sqrt{723}$ 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.
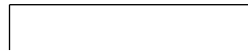   Use an efficient calculator method.

☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐   11.................... ☐

12 $y = 4x^5 - 3x^4 - 2x^3 + 8$
    Calculate the value of y when x = −1.71.
    Use an efficient calculator method.

☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐   12.................... ☐

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

12

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

24

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	
Circle grade	A	B	C	D	E

20

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	
Circle grade	A	B	C	D	E

12

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

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

8

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    $y = a^3 b^2$ 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		_____
Circle grade	A	B	C	D	E	12

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 ....cm³ ☐

2   r = 7 cm, h = 4 cm   2 ....cm³ ☐

3   r = 3.5 cm, h = 2.8 cm   3 ....cm³ ☐

4   r = 1.3 m, h = 1.2 m   4 ....cm³ ☐

Calculate h given:

5   V = 27 cm³, r = 4 cm   5.................cm ☐

6   V = 33 cm³, r = 5 cm   6.................cm ☐

7   V = 32.5 cm³, r = 3 cm   7.................cm ☐

8   V = 17.2 m³, r = 6.1 m   8.................cm ☐

Calculate r given:

9   V = 32 m³, h = 5.4 m   9.................cm ☐

10   V = 84 m³, h = 7.3 m   10................cm ☐

11   V = 17.2 cm³, h = 6.2 cm   11................cm ☐

12   V = 23.5 cm³, h = 5.3 cm   12................cm ☐

Minimum mark	10	8	6	4		_____
Circle grade	A	B	C	D	E	12

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   $D = \dfrac{A}{B}$ 　　　　　　　　　　　　11 A= .... ☐

12   $D = \dfrac{B}{A}$ 　　　　　　　　　　　　12 A= .... ☐

13   $C = \dfrac{AB}{D}$ 　　　　　　　　　　　13 A= .... ☐

14   $3C = \dfrac{BD}{AE}$ 　　　　　　　　　　14 A= .... ☐

15   $C = \dfrac{A}{B} + 3$ 　　　　　　　　　　15 A= .... ☐

16   $C = \dfrac{B}{A} - 2C$ 　　　　　　　　　　16 A= .... ☐

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

16

10 Re-writing formulae – 2
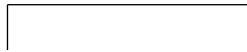
In each question make C the subject:

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   $B = \dfrac{\sqrt{C}}{AD}$

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   $B = \dfrac{D}{C + E}$

15 C=............................ ☐

16   $B = \dfrac{C + D}{E}$

16 C=............................ ☐

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

16

11 Equations – 1

Find the value of y in each equation:

1   y + 13 = 7

2   y – 8 = 3

3   3y = –12

4   –2y = –6

5   –4y = 2

6   7y – 6 = 5y – 14

7   5y – 8 = 9y + 6

8    $\frac{y}{6}$ = 3

9    $\frac{y}{4}$ = –6

10    $\frac{3y}{2}$ = 12

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

12    $\frac{4y – 2}{5}$ = 8

13    $\frac{3}{y}$ = 12

14    $\frac{4}{y}$ = –8

15    $\frac{3}{2y}$ = 12

16    $\frac{5}{4y}$ = –20

1 y=................. ☐

2 y=................. ☐

3 y=................. ☐

4 y=................. ☐

5 y=................. ☐

6 y=................. ☐

7 y=................. ☐

8 y=................. ☐

9 y=................. ☐

10 y=............... ☐

11 y=............... ☐

12 y=............... ☐

13 y=............... ☐

14 y=............... ☐

15 y=............... ☐

16 y=............... ☐

Minimum mark	13	11	8	5		
Circle grade	A	B	C	D	E	16

12 Equations – 2

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

1   $a^2 = 8$

2   $\sqrt{a} = 3.21$

3   $a^2 = 4.2$

4   $8a^2 = 48$

5   $4 = \dfrac{3}{a^2}$

6   $6 = \dfrac{a^2}{4}$

7   $28 = \sqrt{a}$

8   $42 = 3 + \sqrt{a}$

9   $4(a + 3) = 18$

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

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

12   $5(2a - 3) = 6$

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

14   $6(a + 3) = 0$

15   $\dfrac{a + 2}{4} = 8$

16   $\dfrac{a - 3}{5} = 10$

1 a= .... ☐

2 a= .... ☐

3 a= .... ☐

4 a= .... ☐

5 a= .... ☐

6 a= .... ☐

7 a= .... ☐

8 a= .... ☐

9 a= .... ☐

10 a= .... ☐

11 a= .... ☐

12 a= .... ☐

13 a= .... ☐

14 a= .... ☐

15 a= .... ☐

16 a= .... ☐

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

16

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   $a^8 \times \dfrac{1}{a^5}$ 10.................... ☐

11   $a^{-3} \div a^{-5}$ 11.................... ☐

12   $\dfrac{a^4}{a^6}$ 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	

16

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   $\dfrac{6y^3}{2y}$ 9...................... ☐

10 $\dfrac{8y^6}{4y^3}$ 10.................... ☐

11 $\dfrac{15y^8}{10y^{12}}$ 11.................... ☐

12 $\dfrac{20a^3b^2}{10ab}$ 12.................... ☐

13 $\dfrac{15a^4bc^3}{10ab^3}$ 13.................... ☐

14 $\dfrac{16xy^3z^4}{12x^4yz^2}$ 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	16

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

16

16 Expansion of brackets – 2
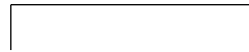
Expand and simplify the following expressions:

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		
Circle grade	A	B	C	D	E	

16

17 Factorisation – 1
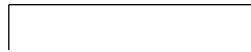
Factorise:

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	
Circle grade	A	B	C	D	E

16

18 Factorisation – 2
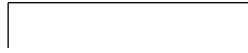
Factorise:

1   $a^2 + 6a + 8$

2   $a^2 + 7a + 6$

3   $a^2 - 2a - 15$

4   $a^2 + 9a + 14$

5   $x^2 - 7x + 10$

6   $x^2 + 2x - 15$

7   $x^2 - 9x + 8$

8   $x^2 - 3x - 40$

9   $y^2 - 9y + 20$

10   $y^2 + 13y + 42$

11   $y^2 - y - 90$

12   $a^2 - b^2$

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

2...(....................) (....................) ☐

3...(....................) (....................) ☐

4...(....................) (....................) ☐

5...(....................) (....................) ☐

6...(....................) (....................) ☐

7...(....................) (....................) ☐

8...(....................) (....................) ☐

9...(....................) (....................) ☐

10..(....................) (....................) ☐

11..(....................) (....................) ☐

12..(....................) (....................) ☐

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

_____
12

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

_____

16

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	8

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=.................. ☐

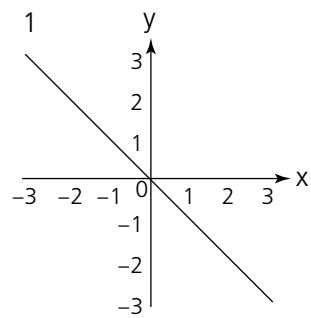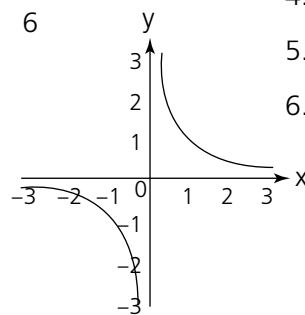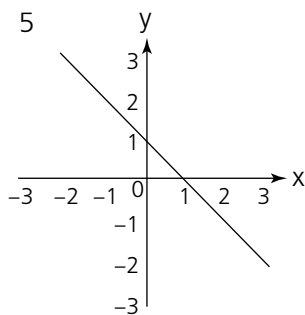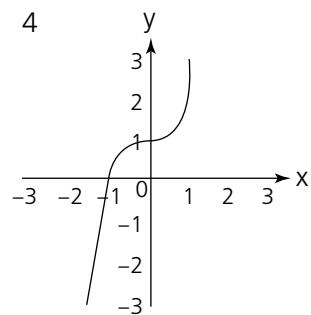| Minimum mark	10	8	6	4		
Circle grade	A	B	C	D	E

12

22 Drawing graphs

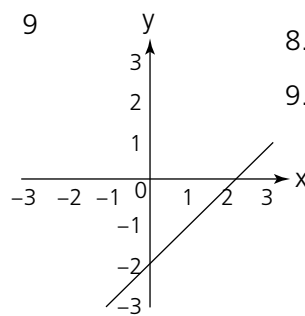Label the following graphs using the **letters** shown below:

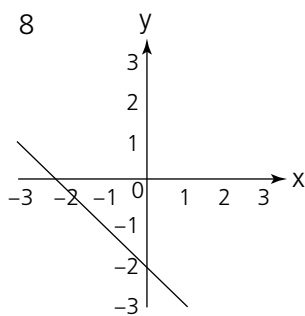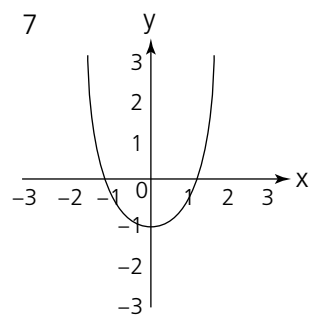a $y = x$ d $y = -x$ g $y = x^2$ j $y = -x^2$ m $y = x^3 + 1$

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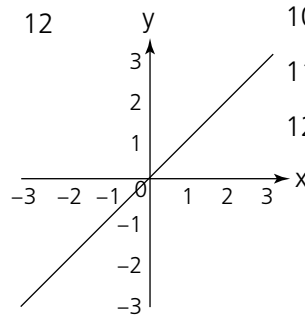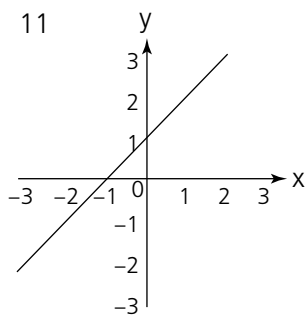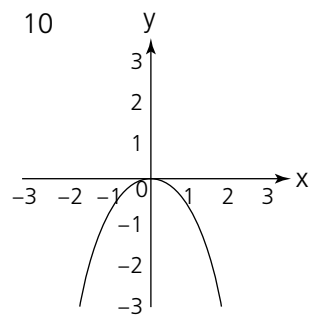
Minimum mark	10	8	6	4	
Circle grade	A	B	C	D	E

_____

12

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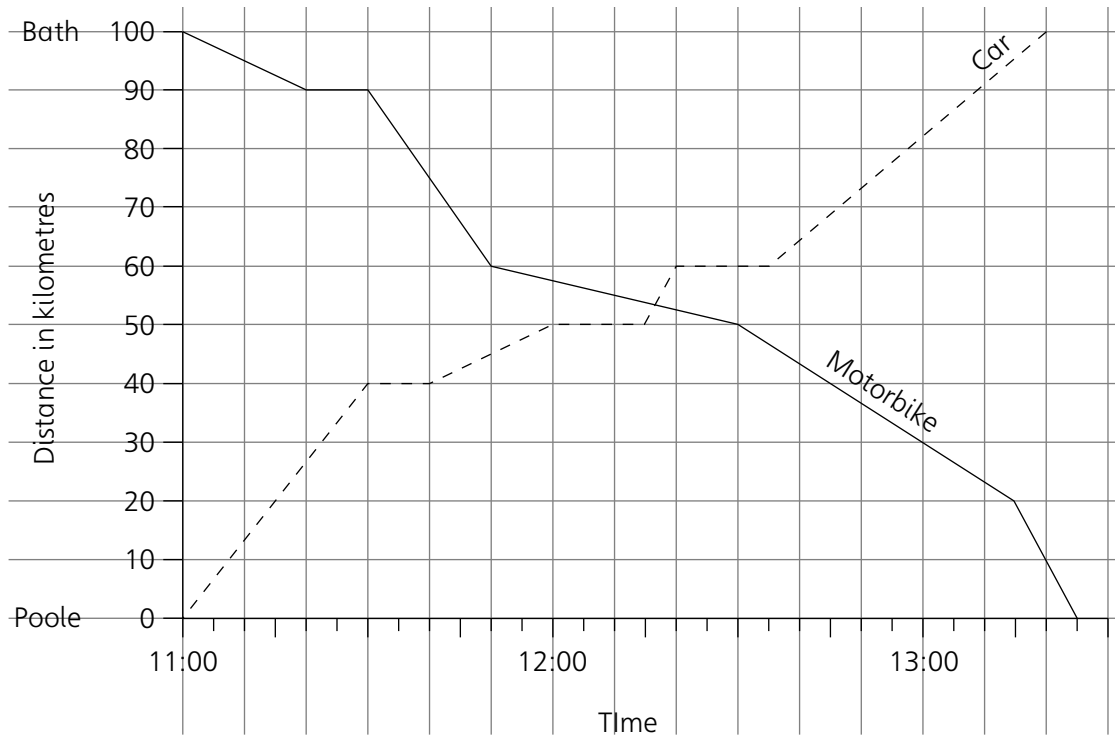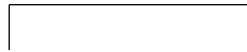
5   What is the distance from Poole to Bath?   5...................... ☐

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 .... ☐

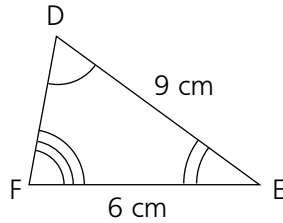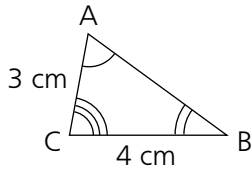   b   11:45?   b .... ☐

Minimum mark	10	8	6	4		_____
Circle grade	A	B	C	D	E	12

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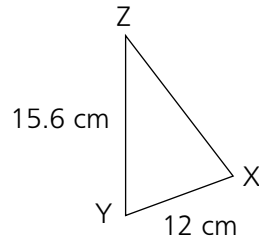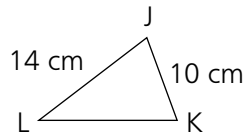
c   Angle L is 43°. What is the size of angle Z?   c...................... ☐

3
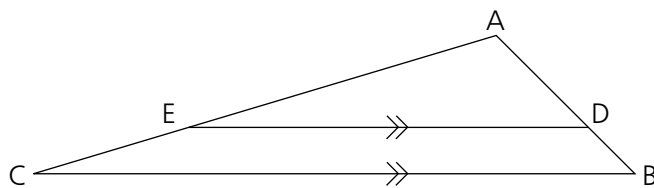
DE is parallel to BC.
AB = 10 cm   BD = 2 cm
AC = 28 cm   BC = 36 cm

Calculate:

a   AE   3a .... ☐

b   DE   b...................... ☐

c   EC   c...................... ☐

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

8

25 Formulae for length, area and volume
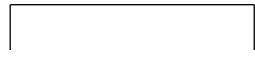
a, b, c and d are lengths.

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   $5a + \dfrac{cd}{e}$ 8...................... ☐

9   $ab^2 + cd^2$ 9...................... ☐

10 $abc + \dfrac{abc}{d}$ 10.................... ☐

11 $a^2b - bc^2$ 11.................... ☐

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

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

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

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

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

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

16

26 Trigonometry: Finding an angle
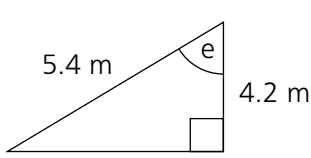
Calculate the size of the angles indicated.
Give your answer correct to three significant figures.

1

3 cm
5 cm
a

1 a= .... ☐

2

12 cm
7 cm
b

2 b= .... ☐

3

8 cm
7 cm
c

3 c=................. ☐

4

6 cm
d
5 cm

4 d= .... ☐

5

5.4 m
e
4.2 m

5 e=................. ☐

6

0.8 m
0.3 m
f

6 f= .... ☐

7

g
6.2 m
3.4 m

7 g= .... ☐

8

1.6 cm
h
8 mm

8 h= .... ☐

Minimum mark	7	5	4	2		
Circle grade	A	B	C	D	E	8

27 Trigonometry: Finding a side

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

1

6 cm
27˚
a

1....................... ☐

2

7 cm
57˚
b

2....................... ☐

3

3.7 m
31˚
c

3....................... ☐

4

10 cm
48˚
d

4....................... ☐

5

18˚
4.8 m
e

5....................... ☐

6

12 cm
38˚
f

6....................... ☐

7

54˚
g
7.2 m

7....................... ☐

8

64˚
5 cm
h
26˚

8....................... ☐
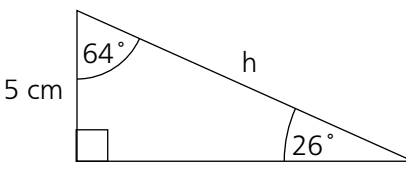
Minimum mark	7	5	4	2	
Circle grade	A	B	C	D	E

8

28 Using cumulative frequency diagrams to compare distributions
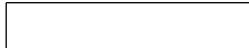
Pupils in two schools each took the same maths exam.
The results are shown in the cumulative frequency diagrams.

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 .... ☐

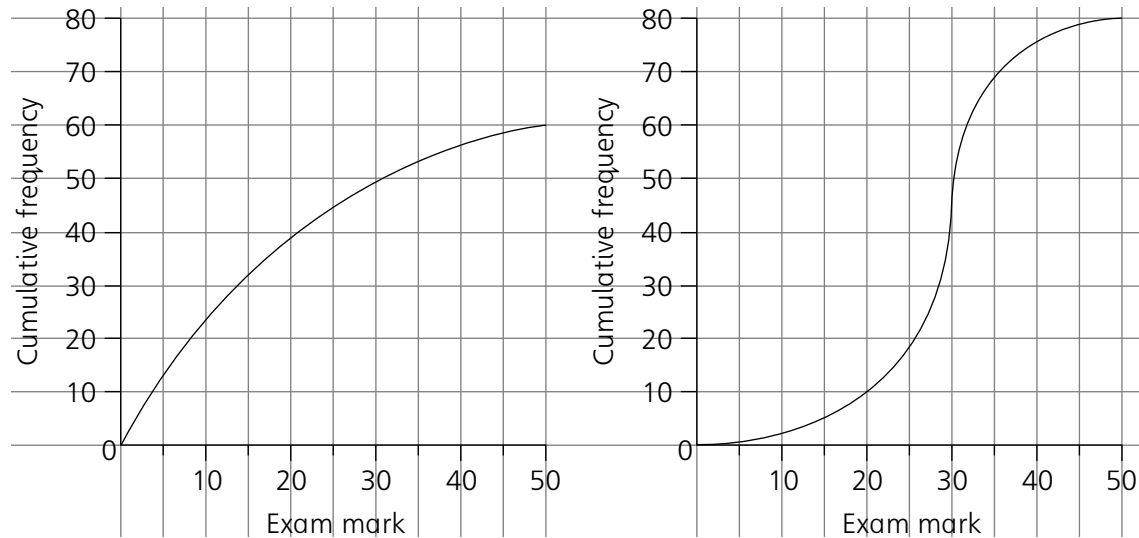   b   School B?   b .... ☐

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   ☐

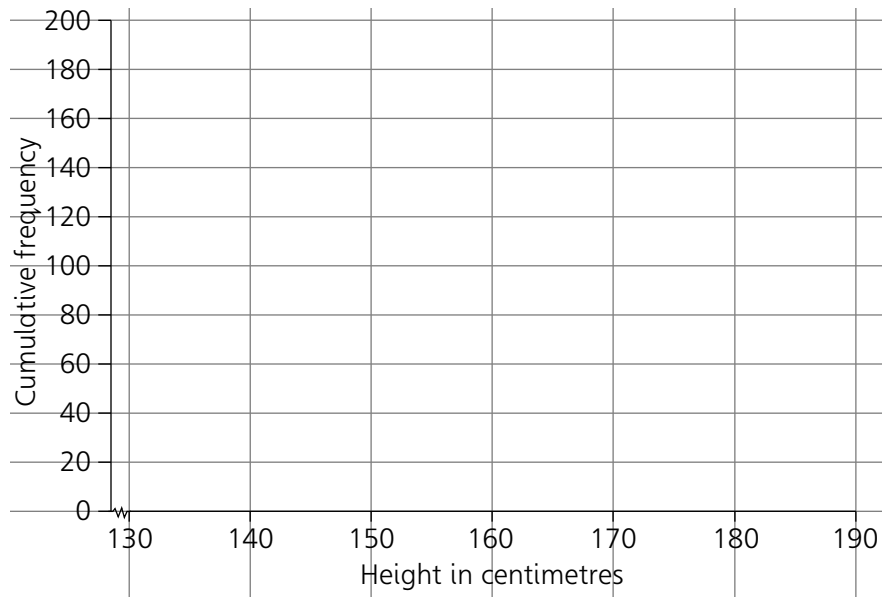| Minimum mark	8	6	5	3		
Circle grade	A	B	C	D	E	

10

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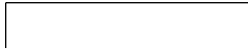
This table shows the height of pupils, in centimetres, in a school:

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

_____
12

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:

1st drawing-pin   2nd drawing-pin

    Point up

    0.4

    Point down

Point up

Point down
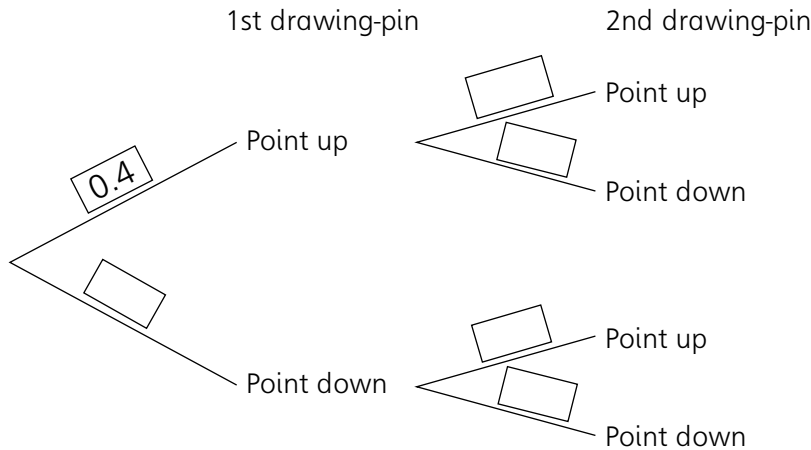
Point up

Point down

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	8