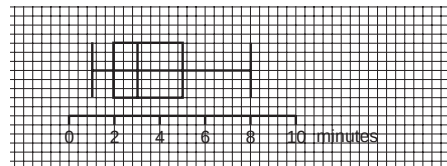
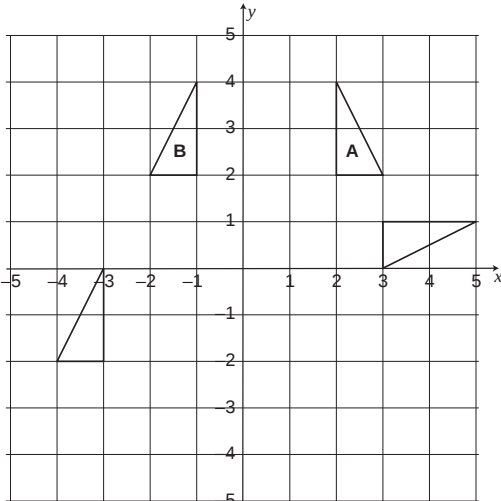


Answers: GCSE Maths paper 1

Question	Answer	Mark	Question	Answer	Mark
1	$\frac{60 \times 5 - 10 \times 3}{100^2}$ $= \frac{270}{10000}$ $= \frac{27}{1000}$	3	7 a i	lower quartile: 2 minutes	
			ii	interquartile range: 3 minutes	3
			b		3
Examiner's tip Round each value to 1 significant figure.			Examiner's tip Remember that each section of the box plot represents 25%.		
2	$3n + 4$	2	8 a	1.8×10^{12}	2
3	i 898.8	1	b	$\frac{(6 \times 10^7)^2}{3 \times 10^4} = \frac{36 \times 10^{14}}{3 \times 10^4}$ $= 12 \times 10^{10}$ $= 1.2 \times 10^{11}$	3
	ii 8.988	1			
	iii 32.1	1			
4 a	Reflection in the line $x = \frac{1}{2}$	1	Examiner's tip You can use the law of indices on these questions. Remember to write your final answer in standard form.		
b		2	9 a i	n^4	1
c		2	ii	$\frac{2}{3h}$	1
			b i	$10x^2 + 29x - 21$	2
			ii	$25x^2 - 40x + 16$	3
			c	$x = 2$ or $x = -6$	3
5 a	$a = -4$	2	Examiner's tip In (b)(ii) remember that $(5x - 4)^2 = (5x - 4)(5x - 4)$. In part (c) when solving the quadratic equation, factorise first.		
Examiner's tip Remember to multiply out the brackets first and then collect like terms.			10 i	36° Since angle $FEG = 90^\circ$, angles in a semicircle, then angle $FGE = 180^\circ - 90^\circ - 54^\circ$ since angles in a triangle add up to 180° .	2
6	$a^2 + bc$ Area		ii	54° Since angle $NGO = 90^\circ$ because a radius and tangent meet at 90° and $FGE = 36^\circ$, and $EGN = 54^\circ$.	2
	$\frac{abc}{\pi b^2}$ Length		Examiner's tip When asked to 'explain' make sure you refer to the circle theorems and not just show working out.		
	$3a^2\sqrt{b^2 + c^2}$ Volume	3	11 a	$y = -2x + 8$	2
			b	$-\frac{1}{3}$	2

Question	Answer	Mark
c	$y = -2x - 1$	2
d	$y = x + \text{any constant}$	2

Examiner's tip

For part (d) remember that two lines are perpendicular if the gradients multiply to give -1 ($\times 3 = -1$).

12	i	1	1
	ii		1
	iii		1
	iv	$= 25 = \pm 5$	2

13

$$\begin{aligned}
 y(x - c) &= ax + ab \\
 yx - yc &= ax + ab \\
 yx - ax &= yc + ab \\
 x(y - a) &= yc + ab
 \end{aligned}$$

$$x = \quad \quad \quad 4$$

Examiner's tip

Remember to show each step in your working.

14

$$1 - \frac{16}{81} = \frac{65}{81} \quad \quad \quad 6$$

Examiner's tip

You could draw a tree diagram to help you or work out the probability of drawing all three colours (i.e. red, green, blue) and multiply by 6 as there are six possible combinations, then subtract this from 1.

Question	Answer	Mark
15		4

Examiner's tip

To rationalise the denominator, multiply both the numerator and the denominator by.

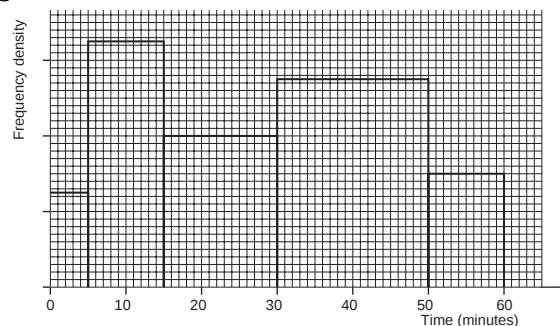
16 a	$a = 3b^2$	3
b	27	1
c	± 8	2

17 a

Time (t) in minutes	Frequency
$0 < t \leq 5$	10
$5 < t \leq 15$	52
$15 < t \leq 30$	48
$30 < t \leq 50$	88
$50 < t \leq 60$	24

2

b



2

Question	Answer	Mark
18	Cone: $\frac{1}{3}\pi r^2 h$ $= \frac{1}{3} \times \pi \times 9 \times 8$ $= 24\pi$ Hemisphere: $\frac{2}{3}\pi r^3$ $= \frac{2\pi \times 3^3}{3}$ $= 18\pi$ Volume = $42\pi \text{ cm}^3$	7
19	$\frac{2n^2 + n - 6}{4n^2 - 9} \times \frac{4n + 6}{n^2 + 3n + 2}$ $= \frac{(2n - 3)(n + 2)}{(2n - 3)(2n + 3)} \times \frac{2(2n + 3)}{(n + 1)(n + 2)}$ $= \frac{2}{(n + 1)}$	6

Examiner's tip

Factorise each part first and then cancel.

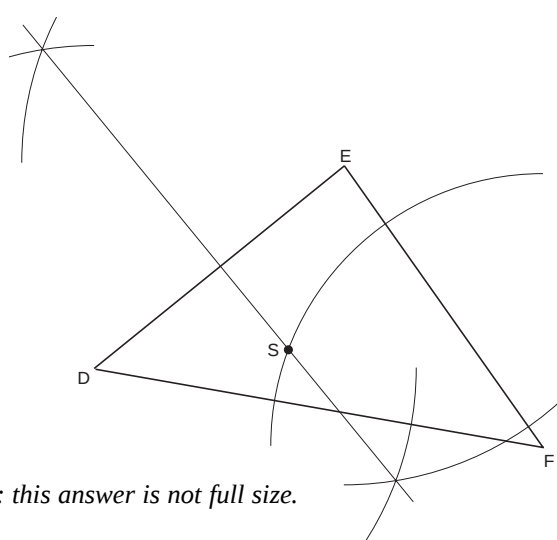
Question	Answer	Mark
20 a i	$\overrightarrow{DC} = -\underline{d} + 2\underline{c}$	1
ii	$\overrightarrow{DF} = \frac{1}{2}(-\underline{d} + 2\underline{c})$	1
b	$\overrightarrow{OF} = \frac{1}{2}(\underline{d} + 2\underline{c})$	
	$\overrightarrow{OG} = \frac{3}{4}(\underline{d} + 2\underline{c})$	5
Since $\overrightarrow{OG}$ is a multiple of $\overrightarrow{OF}$ i.e. $\overrightarrow{OG} = \frac{3}{2}\overrightarrow{OF}$, and since they go through the common point O; O, G and F must lie on a straight line.		

Examiner's tip

Be very systematic when working out vectors.

Total: 100 marks

Answers: GCSE Maths paper 2

Question	Answer	Mark	Question	Answer	Mark
1	7.497 (4 s.f.)	3	4		3
Examiner's tip			NB: this answer is not full size.		
Make sure you show each step in your working.			5	$t = 3.2$	4
2 a	-1, 0, 1, 2, 3	2	Examiner's tip		
b	$t > 14$	3	It is important that you show full working out.		
Examiner's tip			6 a	$10 < t \leq 15$	2
Solve inequalities in the same way that you would solve equations.			b	14.5 hours	4
3 a i	$2 \times 2 \times 2 \times 5$	2			
ii	$3 \times 5 \times 7$	2			
b	HCF = 5	1			
c	LCM = 840	2			
d	$\frac{36}{99} = \frac{4}{11}$	3			
Examiner's tip					
When dividing to find factors, be systematic, e.g. start with 2. When no more factors of 2, try 3 and so on.					

Question	Answer	Mark
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Examiner's tip

Remember to multiply the frequency with the midpoint in part (b) and then divide by 60 i.e. the sum of the frequency.

7 a	12.8 – 8.7 = 4.1 cm	3
b	9.3 cm	2

Examiner's tip

In part (a) remember that the question asks for IH, so you need to subtract EH.

8

$$p = \sqrt[3]{\frac{(4 \times 10^6)^2 \times (2 \times 10^3)}{(4 \times 10^6) \times (2 \times 10^3)}}$$

$$= 2 \times 10^3$$

3

9

$$AB = \frac{9}{\tan 55^\circ}$$

$$= 6.3018...$$

$$AC = \frac{9}{\sin 55^\circ}$$

$$= 10.98...$$

Perimeter = 26.3 cm (3 s.f.)

5

Examiner's tip

To find AC, Pythagoras Theorem or trigonometry could have been used.

10	£420	3
----	------	---

Examiner's tip

Remember to divide by 0.85.

11 a

30 year 7 pupils

2

b

$$\left(\frac{85}{175} \times \frac{50}{120}\right) + \left(\frac{90}{175} \times \frac{70}{120}\right) = \frac{211}{420}$$

3

12 a

$$x = 0 \text{ or } x = \frac{3}{2}$$

2

2.89

2

c

$$x = -0.41 \text{ or } x = 2.41$$

4

13 a

$$6.25 \times 3.765$$

$$= 25.53125 \text{ cm}^2$$

3

b

$$\frac{7.455^2}{6.35}$$

$$= 8.752287402 \text{ cm}$$

3

Question	Answer	Mark
----------	--------	------

14

Area of segment =
sector area – area of triangle

$$= \left(\frac{40^\circ}{360^\circ} \times \pi \times 6^2\right) - \left(\frac{1}{2} \times 6 \times 6 \times \sin 40^\circ\right)$$

$$= 0.996 \text{ cm}^2 \text{ (3 d.p.)}$$

6

Examiner's tip

Answer this question systematically and show all steps in your working.

15 a

$$\frac{1}{2} \times (2x + 1) \times (x + 5) \times \sin 30^\circ = 10$$

$$= \frac{1}{2} \times (2x^2 + 11x - 35)$$

$$2x^2 + 11x - 35 = 0$$

4

b

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-11 \pm \sqrt{11^2 - (4 \times 2 \times -35)}}{4}$$

$$x = \frac{-11 \pm \sqrt{121 + 280}}{4}$$

$$x = \frac{-11 \pm \sqrt{401}}{4}$$

$$x = \frac{-11 + 20.02}{4} \text{ or } x = \frac{-11 - 20.02}{4}$$

$$x = 2.256 \text{ or } x = -7.755$$

since x represents a length:

$$x = 2.26 \text{ cm (2 d.p.)}$$

3

Examiner's tip

Even if you cannot do part (a), part (b) is simply solving a quadratic equation by using a formula.

16

$$42 \times (1.013)^{20}$$

$$= 54.4 \text{ million}$$

3

b

Examiner's tip

The use of a multiplier is important when working out the answer. Do not attempt to work it out for each year!

17

$$x = 3, y = -7$$

$$x = -1.8, y = 7.4$$

6

Question	Answer	Mark
----------	--------	------

18	Calculate BD $BD = \sqrt{(12.6)^2 + (14.2)^2 - (2 \times 12.6 \times 14.2 \times \cos 75^\circ)}$ BD = 16.36 cm $\frac{\sin \hat{ABD}}{17.3} = \frac{\sin 57^\circ}{16.36}$ $\sin \hat{ABD} = \frac{\sin 57^\circ}{16.36} \times 17.3$ angle ABD = 62.48°	6
----	--	---

Examiner's tip

This is an example of a multisteped question. First find the length of BD by using the cosine rule and then the size of angle ABD by using the sine rule.

Question	Answer	Mark
----------	--------	------

19	a $n^2 + (n + 1)^2$ $n^2 + (n^2 + 2n + 1)$ $= 2n^2 + 2n + 1$ $\underbrace{2n(n + 1)} + 1$ Always even 3 b $(2n + 1)^2 - (n + 2)^2$ $(4n^2 + 4n + 1) - (n^2 + 4n + 4)$ $= 3n^2 - 3$ $= 3(n^2 - 1)$ $= 3(n - 1)(n + 1)$ 3	
----	--	--

Total 100 marks

HOW TO ASSESS YOUR GRADE

The grid below suggests grades that you might have expected to achieve with different scores on these papers. The marks are combined from paper 1 and paper 2 and are out of 200. No account has been made of the coursework marks. It is an indication only and does not imply that this is the grade you will receive in the real examination.

Grades D and below are not awarded on Higher Tier.

A*	162–200
A	124–161
B	88–123
C	46–87

Answers to mock examination Paper 1

- 1 (a) 12.426 [3]
 (b) 6.5 [3]
 (c) 128 [3]

EXAMINER'S TIP

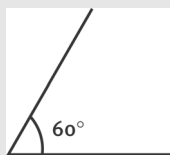
Remember 2^3 means $2 \times 2 \times 2$.

- 2 (a) (i) 15 cm^2
 (ii) 16 cm [2]
 (b) length 17.5 cm [2]
 width 10.5 cm [2]
- 3 4.1 [2]

EXAMINER'S TIP

Remember to divide by the sum of the frequencies.

4



[3]

EXAMINER'S TIP

Constructing an angle of 60° is similar to constructing an equilateral triangle.

- 5 (a) £4.32 [3]
 (b) (i) 0.85 [1]
 (ii) $300 \times 0.85 = 255$ [3]

EXAMINER'S TIP

For part (b) (ii) it is easier to work out the number of pencils which will break and then subtract from 300.

- 6 27 cm^3 [4]

EXAMINER'S TIP

Work out the area of one face first then the length of the side.

- 7 (a) Matthew £325 [3]
 Emily £195 [3]
 (b) $\frac{3}{8}$ [2]

- 8 (a) (i) $x = 72^\circ$
 (ii) alternate angles with the 72° [2]
 (b) (i) $y = 54^\circ$
 (ii) Base angles in an isosceles triangle are equal and angles in a triangle add up to 180° . [3]
 (c) $z = 31^\circ$ [2]

EXAMINER'S TIP

Always make explanations clear.

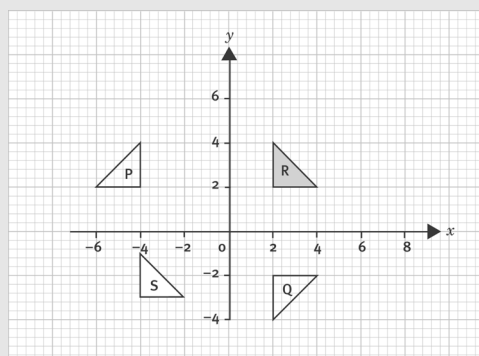
- 9 (a) $x = 4$ [1]
 (b) $w = 6$ [2]
 (c) $y = 3$ [2]
 (d) $r = 5$ [3]
 (e) $5v - 3 = 8v$
 $-3 = 3v$
 $v = -1$ [3]

EXAMINER'S TIP

For part (e) multiply both sides by 2v.

- 10 $\frac{(60 \times 5) - (10 \times 3)}{100^2}$
 $= \frac{270}{10000}$
 $= \frac{27}{1000}$ [3]

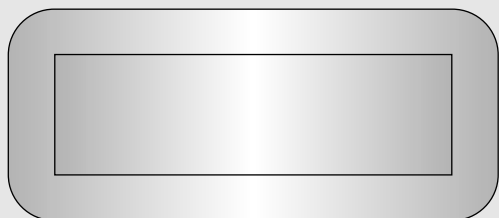
11



[3]

[6]

12



[3]

EXAMINER'S TIP

Remember to use a compass to form the arcs at the corners of the rectangle.

13 (a) Robbie's = £681.50

TV Mania = £608

[4]

(b) $\frac{240}{0.8} = \frac{2400}{8} = £300$

[4]

EXAMINER'S TIP

For part (b) remember that you are finding the original price so divide by the multiplier of 0.8.

14 (a) -3, -2, -1, 0, 1, 2

[2]

(b) $p \geq 3$

[2]

EXAMINER'S TIP

For part (a) remember not to include the -4.

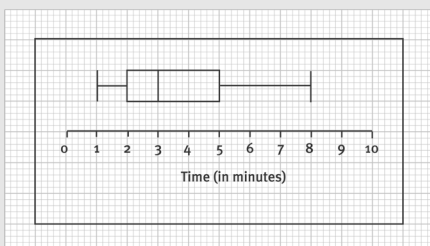
15 (a) (i) lower quartile is 2 minutes

(ii) the interquartile range 3 minutes

[2]

(b)

[3]



16 (a) 1.8×10^{13}

[2]

(b) 2×10^{-2}

[2]

17 (a) OCA is 16° because the angle where a radius and tangent meet is 90° .
Hence $90^\circ - 74^\circ$ is 16° .

[1]

(b) Angle OCA is 16°
Angle OAC is 16° } isosceles triangle

Hence angle AOC is 148° .

(Angles in a triangle add up to 180° .)

The angle at the circumference is half the angle at the centre.

Hence angle ADC is $(148^\circ \div 2)$.

ADC = 74°

[3]

EXAMINER'S TIP

You need to give clear mathematical explanations to justify your answer.

18 (a) y^8

[1]

(b) $-2x + 3$

[2]

(c) $a^2 + 2ab + b^2$

[2]

(d) (i) $3(2a - b)$

(ii) $3pq(4p - 3q)$

[3]

(e) (i) $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

(ii) 1

(iii) $16^{\frac{1}{2}} = \sqrt{16} = +4 \text{ or } -4$

[3]

EXAMINER'S TIP

Remember that $(a + b)^2$ means $(a + b)(a + b)$.

Answers to mock examination Paper 2

1 (a)
$$\begin{array}{c|cccccccc} 1 & 7 & & & & & & & \\ 2 & 6 & 7 & 7 & 8 & & & & \\ 3 & 1 & 1 & 1 & 2 & 2 & 4 & 6 & 9 & 9 \\ 4 & 0 & 1 & 2 & & & & & & \end{array}$$

5 3 | Key $5/3 = 5.3$ kg

[3]

(b) 3.2 kg

[1]

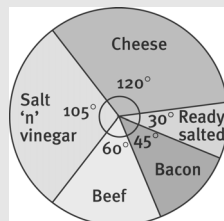
EXAMINER'S TIP

Remember to order the values in the stem and leaf diagram.

2 $3n + 2$

[2]

3



[4]

EXAMINER'S TIP

Angles must be measured accurately to within plus or minus 2 degrees.

4 (a) $p = 9$

[2]

(b) $p = 3q^2 + r$
 $q = \pm \sqrt{\frac{p-r}{3}}$

[3]

EXAMINER'S TIP

In part (a) remember to square the 2 first then multiply by 3.

5 $t = 3.2$

[4]

6 (a) 95.0 cm^2

[2]

(b) 32.6 cm

[3]

EXAMINER'S TIP

You need to know the formulas for the area and circumference of a circle.

7 (a) 10.514852

[3]

(b) 10.5

[1]

8 (a) $-p$

[1]

(b) x^4

[1]

(c) $x^2 - 6x + 8$

[1]

(d) $12x^6$

[1]

9 (a) $8000 \times (1.04)^3$

$= 8998.91$

Interest = £998.91

[4]

(b) $\frac{36000}{142000} \times 100\% = 25.4\%$

[3]

EXAMINER'S TIP

When calculating the percentage profit remember to divide by the original value.

10 (a) Volume = 1020 cm^3

[3]

(b) Volume = $1.02 \times 10^{-3} \text{ m}^3$

[1]

11 (a) $10 < t \leq 15$

[1]

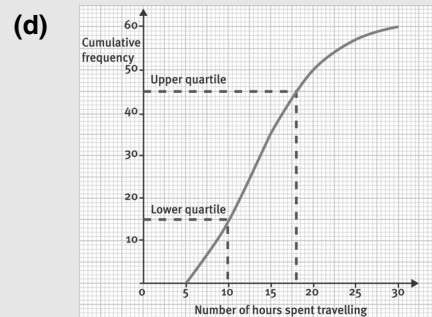
(b) 14.5 hours

[4]

(c)

Number of hours spent travelling (t)	Cumulative frequency
$0 < t \leq 5$	0
$0 < t \leq 10$	14
$0 < t \leq 15$	35
$0 < t \leq 20$	50
$0 < t \leq 25$	57
$0 < t \leq 30$	60

[1]



[2]

(e) Interquartile range $18 - 10$
 approximately 8 hours

[3]

EXAMINER'S TIP

For part (e) it is useful to show the lower and upper quartile lines.

12 (a) $54 = 2 \times 3^3$
 $36 = 2^2 \times 3^2$ [4]
 (b) HCF = 18 [2]

13 $v = 2$
 $w = -1$ [4]

14

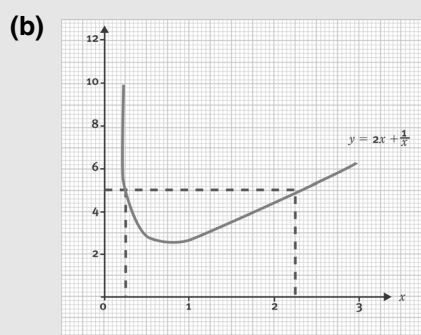
$\frac{p^2q}{\pi}$	$r(\sqrt{p^2 - q^2})$	$4(p^2 - r^2)$	$\frac{p^2qr}{4\pi}$	$p(q + r)^2$
	✓	✓		

 [2]

15 (a)

x	0.1	0.2	0.4	0.6	0.8	1	2	3
y	10.2	5.4	3.3	2.87	2.85	3	4.5	6.3

 [2]



(c) approximately $x = 2.3$ and $x = 0.2$ [2]

EXAMINER'S TIP

To solve $2x + \frac{1}{x} = 5$, draw a line across from $y = 5$ and find the points of intersection – these are the required solutions.

16 4.48 cm (3sf) [5]

EXAMINER'S TIP

Firstly find BD by Pythagoras' theorem, then use the sine ratio to find BC.

17 (a) $y = -\frac{1}{2}x + 3$ [3]

(b) $-\frac{1}{3}$ [2]

(c) $4x + 2y = 8$
 $2y = 8 - 4x$
 $y = 4 - 2x$
 equation of the line is $y = -2x - 1$ [2]

EXAMINER'S TIP

It is helpful to write the equation in the form $y = mx + c$ when answering questions like these.

18 2.025×10^{-3} [3]

19 (a) AB = 8.51 cm [2]
 (b) DE = 4.6 cm [2]

20 (a) $3(x - 4)(x + 2) = \text{Volume}$ [2]

(b) $3(x - 4)(x + 2) = 48$
 $(x - 4)(x + 2) = 16$
 $x^2 - 4x + 2x - 8 = 16$
 $x^2 - 2x - 24 = 0$ [4]

(c) $x^2 - 2x - 24 = 0$
 $(x + 4)(x - 6) = 0$
 $x = -4$
 $x = 6$
 Using $x = 6$ Length = 8 cm
 Width = 2 cm [3]

EXAMINER'S TIP

Remember when asked to solve a quadratic equation, make sure it is equal to zero, and then factorise.

HOW TO ASSESS YOUR GRADE

The grid below shows the grades that you might have expected to achieve with different scores on these papers. The marks are combined from paper 1 and paper 2 and are out of 200. No account has been made of the coursework marks. It is an indication only and does not imply that this is the grade that you will receive in the real examination.

Grades F and below are not awarded on the Intermediate Tier

B	132 – 200
C	89 – 131
D	49 – 88
E	0 – 48