OCR
Oxford Cambridge and RSA

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GCSE (9–1) Mathematics
J560/03 Paper 3 (Foundation Tier)
Sample Question Paper

Date – Morning/Afternoon
Time allowed: 1 hour 30 minutes

worked solutions

You may use:
- A scientific or graphical calculator
- Geometrical instruments
- Tracing paper

First name	JustMaths
Last name	
Centre number	
Candidate number	

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **100**.
- The marks for each question are shown in brackets **[ ]**.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- This document consists of **20** pages.

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Answer **all** the questions

1 **(a)** Solve.

(i) $2x = 18$

$\frac{}{2} \quad \frac{}{2}$

(a)(i) $x =$ 9 **[1]**

(ii) $x + 2 = 5$

$-2 \quad -2$

(ii) $x =$ 3 **[1]**

(iii) $\frac{x}{3} = 15$

$\times 3 \quad \times 3$

(iii) $x =$ 45 **[1]**

(b) **(i)** Find the value of t when $g = 4$ and $h = 7$.

$t = 12g - 5h$

$12 \times 4 - 5 \times 7$

$48 - 35$

(b)(i) $t =$ 13 **[2]**

(ii) Rearrange to make r the subject.

$4r - p = q$

$+p \quad +p$

$\frac{4r}{4} = \frac{q+p}{4}$

(ii) $r = \frac{q+p}{4}$ **[2]**

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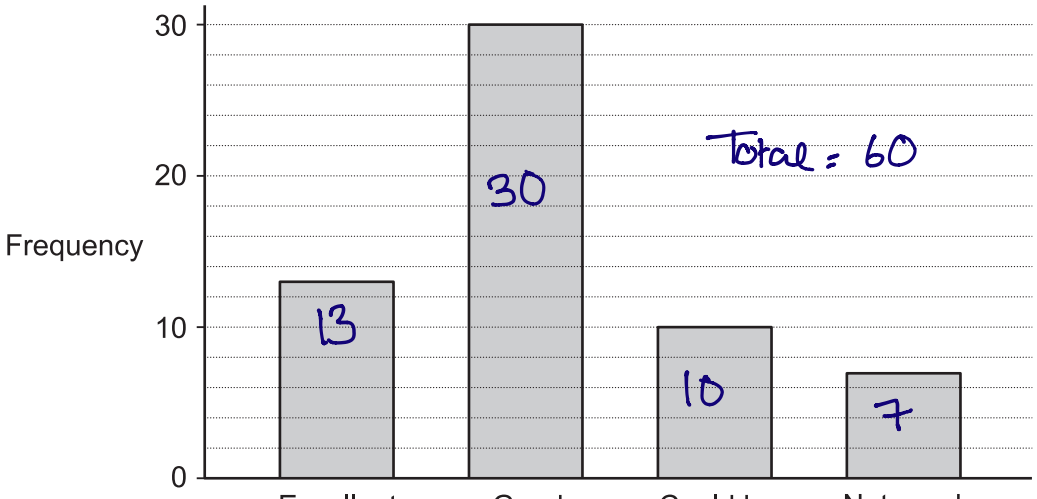
2 Cambury Council asked 60 customers what they thought of the local leisure centre. The results are shown in this bar chart.



Draw and label a pie chart to represent this data.

THESE ANGLES ARE NOT DRAWN TO SCALE!! YOU WILL NEED TO USE A PROTRACTOR !!

[5]

3 **(a)** How many 20p coins would you need to make up £7000?

£1 = 5 coins
£7000 35000 ×7000

(a) 35,000 **[2]**

(b) Each 20p coin weighs 5 g.

Lizzie says

I can lift £7000 worth of 20p coins.

Is Lizzie's claim reasonable?
Show your working and state any assumptions you have made.

35000 × 5g = 175,000
= 175 kg

No it is not reasonable.. this would be too heavy.

a person weighs about 60kg

.....

..... **[4]**

(c) How have any assumptions you have made affected your answer to part **(b)**?

I have assumed the weight of a person and 3 times that weight cannot be carried ..... **[1]**

4 Antonio works Monday, Tuesday and Wednesday.

He starts work at 4.00 pm and finishes at 10.30 pm. 6 ½ hours
Antonio is paid £10 per hour on weekdays.

One week, he also works for 4 hours on Sunday.
He is paid 50% more on Sundays. £15 per hour

How much does Antonio earn altogether this week?

M, T, W

6·5 × 10 = £65

× 3

£195

Sunday

⇒ 4 × 15 = £60

Total = 195 + 60

£ 255 **[6]**

5 Darren says

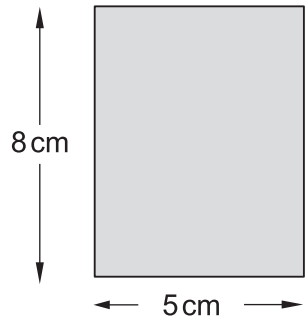
I can run 100 m in 15 seconds, so I should be able to run 800 m in 120 seconds.

Do you think that he would take more or less than 120 seconds to run 800 m?
Explain your answer, with reference to any assumptions Darren has made.

he has assumed he will run at the same speed for 800 m as 100 m but he will be slower, so it will take him longer than 120s

[3]

6 Jo makes a pendant from a rectangular piece of silver.



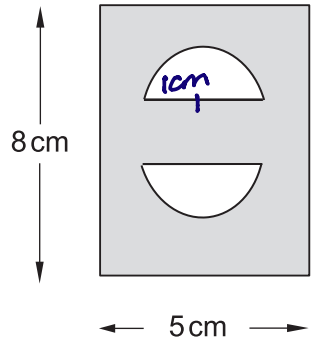
Not to scale

(a) Work out the area of this rectangle.

8×5

(a) 40 cm^2 **[1]**

(b) To complete the pendant, Jo cuts two semicircles of radius 1 cm from the rectangle, as shown below.



Not to scale

Show that the shaded area is 36.9 cm^2 correct to three significant figures. **[4]**

area of 1 circle
$= \pi \times 1^2 = 3.14\ cm^2$

shaded area $= 40 - 3.14\ldots$
$= 36.85840735$
$= 36.9\ cm^2$ (3 s.f)

(c) The silver Jo uses is 2 mm thick.

Find the volume of silver in the pendant.
Give your answer in cm^3.

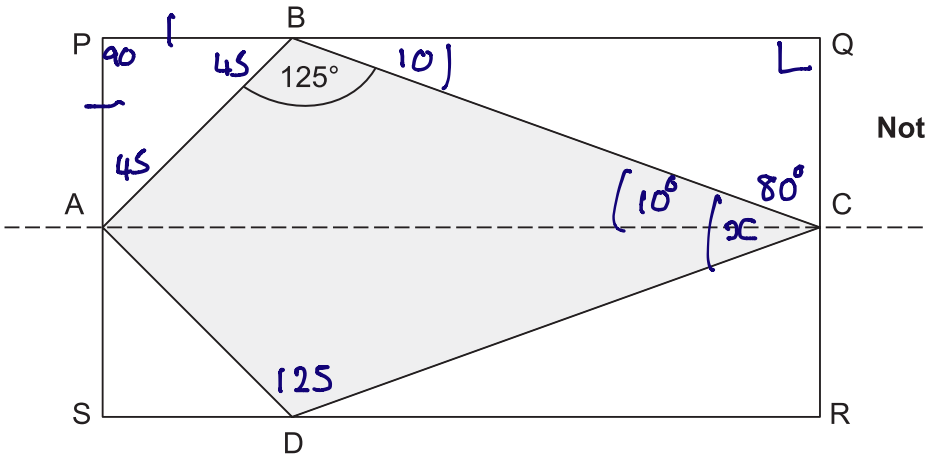
Volume = cross sectional area × 0·2

36·9 × 0·2

= 7·371681469

(c) 7·37 cm^3 **[3]**

7 PQRS is a rectangle.
A, B, C and D are points on SP, PQ, QR and RS respectively.
AC is the line of symmetry for the diagram.



Not to scale

(a) Angle ABC = 125°.

Write down the size of angle ADC.

(a) Angle ADC = 125 ° **[1]**

(b) AP is the same length as PB.

Work out the size of angle BCD.
Show your reasoning clearly.

$A\hat{P}B = 90°$

$P\hat{B}A = P\hat{A}B = 45°$ (Isosceles triangle so has 2 equal angles)

$Q\hat{B}C = 180-(125+45) = 180-170 = 10°$ (angles on a straight line)

$Q\hat{C}B = 90+10 = 180-100 = 80$ (angles in a triangle = 180)

$A\hat{C}B = 10°$

$BCD = 20$

(b) Angle BCD = 20 ° **[4]**

8 **(a)** The nth term of a sequence is given by $3n + 5$.

Explain why 21 is not a term in this sequence.

$21 = 3n + 5$
$-5 \quad -5$
$16 = 3n$
$n = 16/3 = 5.\dot{3}$

n is not a whole number

[2]

(b) Here are the first three terms in a sequence.

1 2 4

This sequence can be continued in different ways.

(i) Find one rule for continuing the sequence and give the next two terms.

Rule 1 start at 1 add 2

Next two terms 6 8

[2]

(ii) Find a second rule for continuing the sequence and give the next two terms.

Rule 2 start at 1 and double the previous term

Next two terms 16 32

[2]

9 Three friends, Ann (A), Bob (B) and Carol (C), go on holiday together.

(a) They book a row of three seats on the plane.
When they arrive at the plane they sit in a random order.

(i) List all the different orders they could sit on the three seats.
The first one has been done for you.

Seat 1	Seat 2	Seat 3
A	B	C
A	C	B
B	A	C
B	C	A
C	A	B
C	B	A

[2]

(ii) What is the probability that Ann and Carol sit next to each other?

$\frac{4}{6} = \frac{2}{3}$

(a)(ii) $\frac{2}{3}$ **[1]**

(iii) What is the probability that Bob sits in seat 1 with Ann next to him?

(iii) $\frac{1}{6}$ **[1]**

(b) Ann, Bob and Carol have a total budget of £500 to rent a holiday apartment.
The apartment normally costs £50 per night, but they can get a 20% discount if they book early.

Calculate how many extra nights they can stay in the apartment if they book early.

10% = £50
20% = £100

£50 per night => 2 nights

(b) 2 nights **[4]**

10 Calculate.

(a) $\sqrt{3136}$

(a) 56 **[1]**

(b) $\sqrt[4]{625}$

(b) 5 **[1]**

(c) 5^{-2}

$\frac{1}{5^2}$

(c) $\frac{1}{25}$ **[1]**

11 Ema has done some calculations.

For each calculation, explain how you know the answer is wrong without working out the correct answer.

(a) $0.38 \times 0.26 = 0.827$

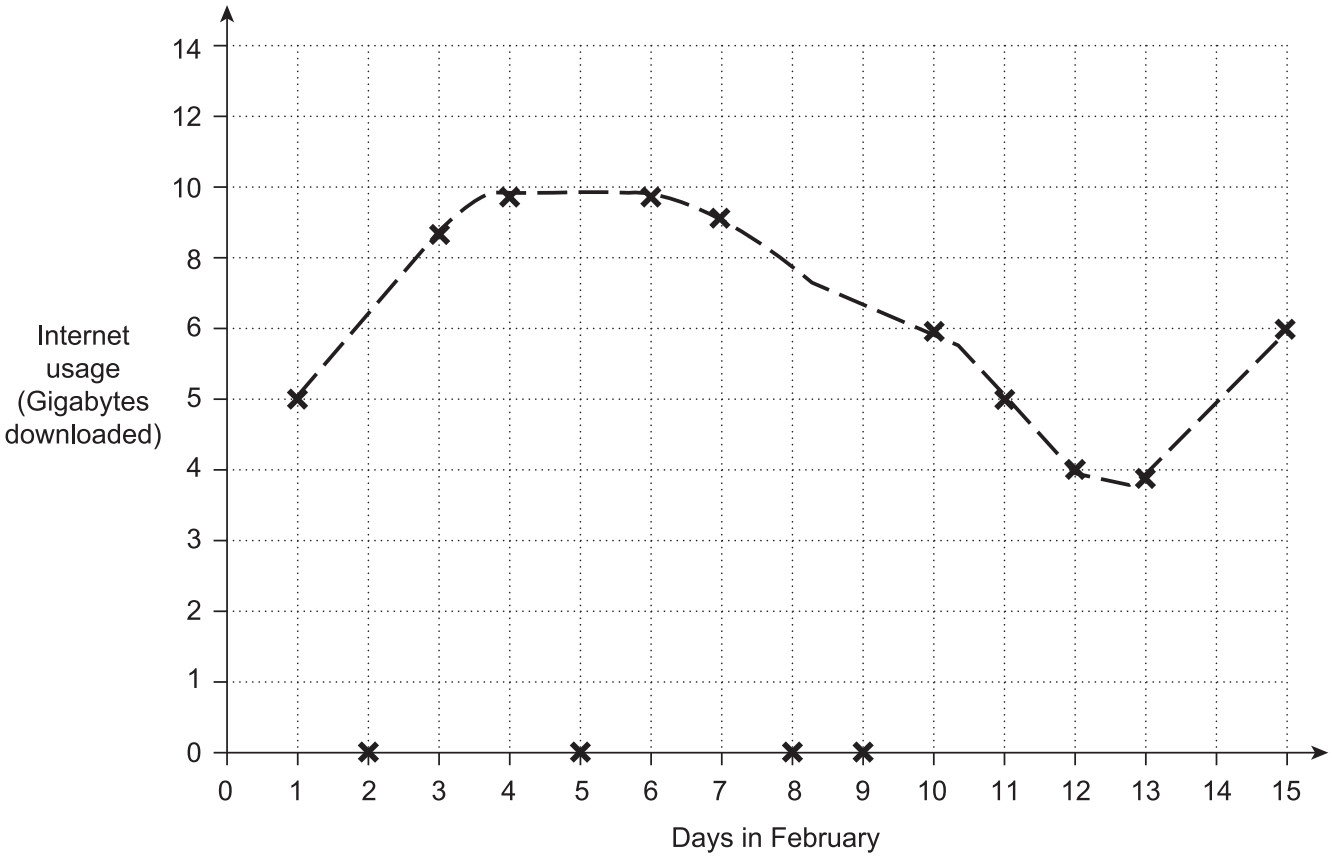
0·4×0·3 = 0·12 and the answer should have 4 decimal places

[1]

(b) $\frac{3}{4}+\frac{2}{3}=\frac{5}{7}$ 0·75 + 0·66 > 1 and 5/7 is smaller than 1

[1]

12 Shinya's internet service provider gives him a graph of his internet usage in the first part of February.



State two reasons why this graph is misleading.

1 the y axis is not linear

2 when the internet usage is 0 these days are not shown

[2]

13 **(a)** Mia cycled 23 km, correct to the nearest km.

What is the least distance Mia could have cycled?

23 → nearest 1 km
0.5 km → 23.5
0.5 km → 22.5

(a) 22.5 km **[1]**

(b) A number x, rounded to one decimal place, is 4.7.
So the error interval for x is given by $4.65 \leqslant x < 4.75$.

(i) A number y, rounded to **two** decimal places, is 4.13.

Write down the error interval for y.

4.13 2dp 0.01
0.005 → 4.135
0.005 → 4.125

(b)(i) $4.125 \leqslant y < 4.135$ **[2]**

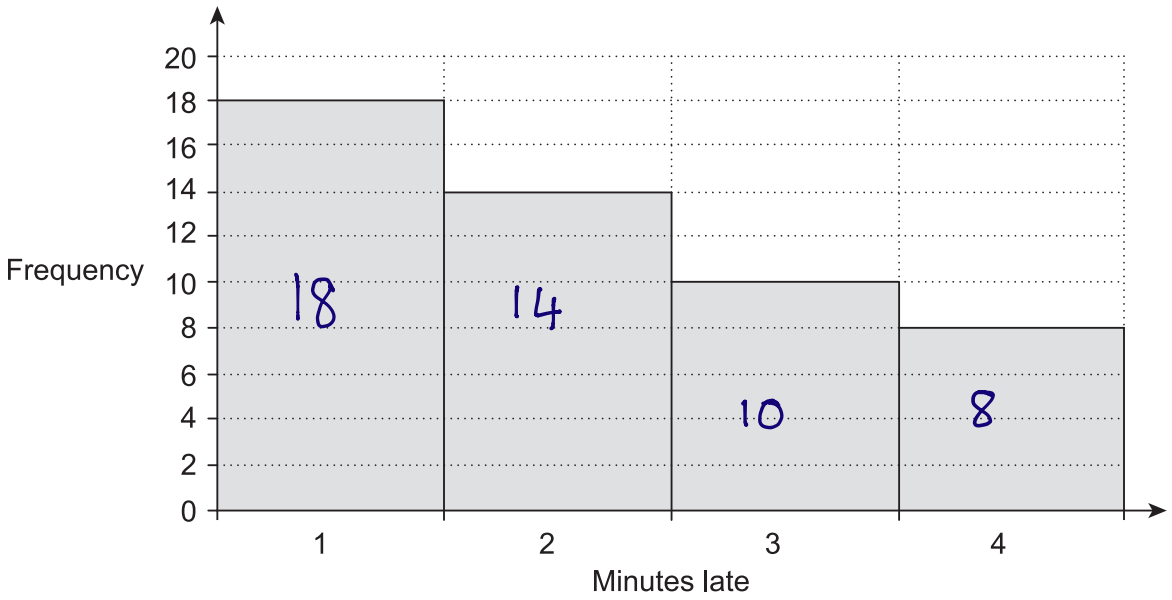
(ii) A number z, rounded to two significant figures, is 4700.

Write down the error interval for z.

4700 2 sf 100
50 → 4750
50 → 4650

(ii) $4650 \leqslant z < 4670$ **[2]**

14 This frequency diagram summarises the number of minutes Astrid's train was late over the last 50 days.



(a) Use information from this diagram to estimate the probability that her train will be 4 minutes late tomorrow.

Total = 18 + 14 + 10 + 8
= 50

$\frac{8}{50}$

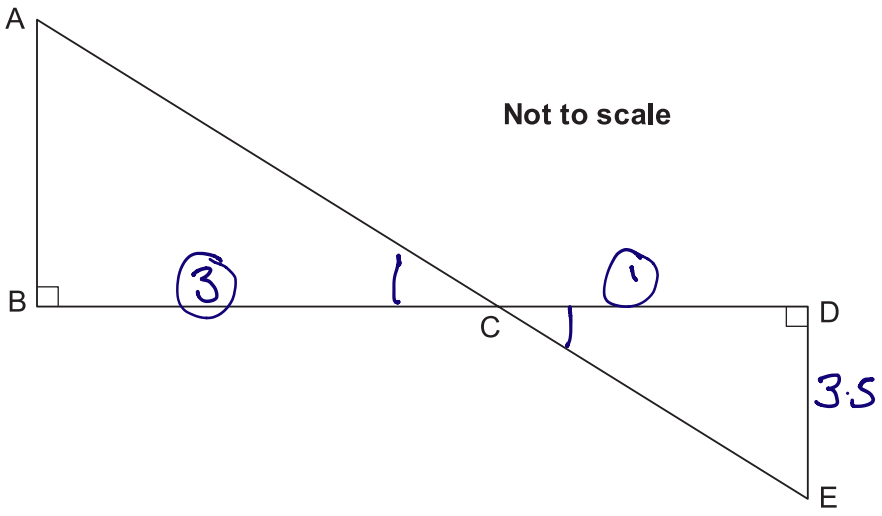
(a) ..... **[2]**

(b) Explain whether your answer to part **(a)** gives a reliable probability.

no as its only based on 50 days

..... **[1]**

15 In the diagram below, AE and BD are straight lines.



(a) Show that triangles ABC and EDC are similar.

$A\hat{B}C = C\hat{D}E = 90°$ right angles

$A\hat{C}B = D\hat{C}E$ as they are vertically opposite

$B\hat{A}C = C\hat{E}D$ angles in a triangle = 180

Hence triangles are similar

[3]

(b) The length DE is 3.5 m.
The ratio BC : CD = 3 : 1.

Find the length AB.

$AB = 3.5 \times 3 = 10.5$

(b) 10.5 m **[2]**

16 Leo is using these numbers to make a new number.

11	1	3	6

- He can use brackets, +, −, × and ÷ as often as he wishes.
- He cannot use any number more than once.
- He cannot use powers.
- He cannot put numbers together, e.g. he can't use 136.

What is the biggest number he can make?
Show how he can make this number.

$6 \times 11 = 66$

$3 + 1 = 4$ ×

264

264 is the biggest number

[4]

17 180 g of copper is mixed with 105 g of zinc to make an alloy.

The density of copper is 9 g/cm^3.
The density of zinc is 7 g/cm^3.

(a) Work out the volume of copper used in the alloy.

	C	Z
mass	180g	105g
Density	9g/cm^3	7g/cm^3
Volume	180 ÷ 9 = 20cm^3	105 ÷ 7 = 15cm^3

$D = \frac{m}{V}$ $V = \frac{m}{D}$

(a) 20 cm^3 **[2]**

(b) What is the density of the alloy?

mass = 180 + 105
= 285g
Volume = 35cm^3

$D = \frac{285}{35} = 8.142857$

(b) 8.14 g/cm^3 **[4]**

18 **(a)** **(i)** Solve.

$5x + 1 > x + 13$

$-x \quad -x$

$4x > 12$

(a)(i) $x > 3$ **[3]**

(ii) Write down the largest integer that satisfies $5x - 1 < 10$.

$+1$

$5x < 11$

$x < \frac{11}{5}$

$x < 2 \cdot 2$

(ii) 2 **[1]**

(b) Solve.

$3x^2 = 75$

$x^2 = \frac{75}{3}$

$x^2 = 25$

$x = \sqrt{25}$

(b) $x = \pm 5$ **[2]**

(c) Solve.

$4x + 3y = 5$ ①

$2x + 3y = 1$ ②

① − ②

$2x = 4$

$x = 2$

substitute ②

$2 \times 2 + 3y = 1$

$4 + 3y = 1$

$3y = -3$

$y = -1$

(c) $x =$ 2

$y =$ −1

[3]

19 Here are the interest rates for two accounts.

Account A	Account B
Interest: 3% per year compound interest.	Interest: 4% for the first year, 3% for the second year and 2% for the third year.
No withdrawals until the end of three years.	Withdrawals allowed at any time.

Derrick has £10 000 he wants to invest.

(a) Calculate which account would give him most money if he invests his money for 3 years. Give the difference in the interest to the nearest penny.

A

$10,000 \times 1.03 \times 1.03 \times 1.03$

$= 10927.27$

B

$10,000 \times 1.04 \times 1.03 \times 1.02$

$= 10926.24$

(a) Account B by 103 p **[5]**

(b) Explain why he might **not** want to use Account A.

he may want to take money out

[1]