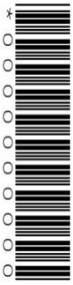# OCR
Oxford Cambridge and RSA

H

GCSE (9–1) Mathematics
J560/04 Paper 4 (Higher Tier)

Practice paper – Set 2
Time allowed: 1 hour 30 minutes

You may use:
• a scientific or graphical calculator
• geometrical instruments
• tracing paper

First name	
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).
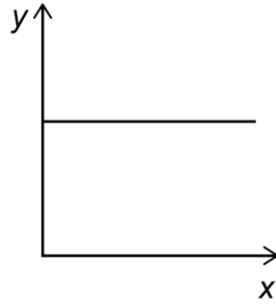• Do **not** write in the barcodes.

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.
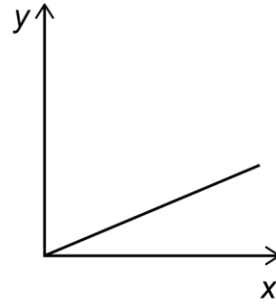• This document consists of **20** pages.

Turn over

Answer **all** the questions.

1   (a)   Which graph shows that *y* is directly proportional to *x*?
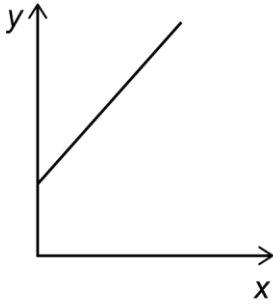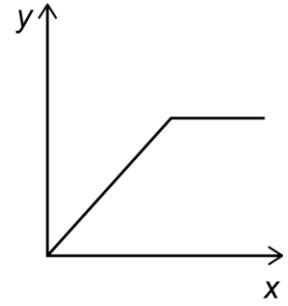

(a) ....[1]

(b)   In this table *y* is directly proportional to *x*.

x	16	24
y	36	b

Calculate *b*.

(b) ....[2]

2 The number 9702 can be written as $2 \times 3^2 \times 7^2 \times 11$.

(a) Here are some of the factors of 9702.

1 2 3 6 7 11 77 126 882 1386 1617 3234 4851 9702

Find two more factors of 9702.

(a)…………………… and ……………………**[2]**

(b) Find the highest common factor (HCF) of 210 and 9702.

(b)...**[3]**

(c) Gwen says that 45 is **not** a factor of 9702.

Explain how you know that she is correct.

....

....**[1]**
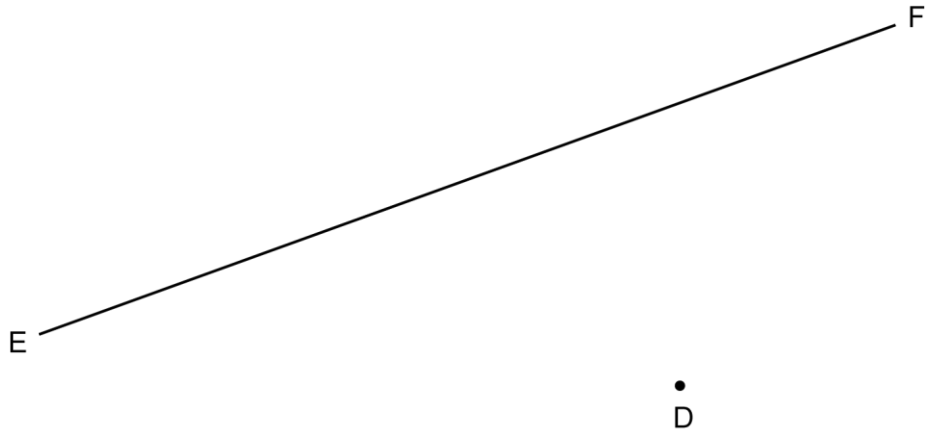
3 **(a)** Triangle ABC is shown below.
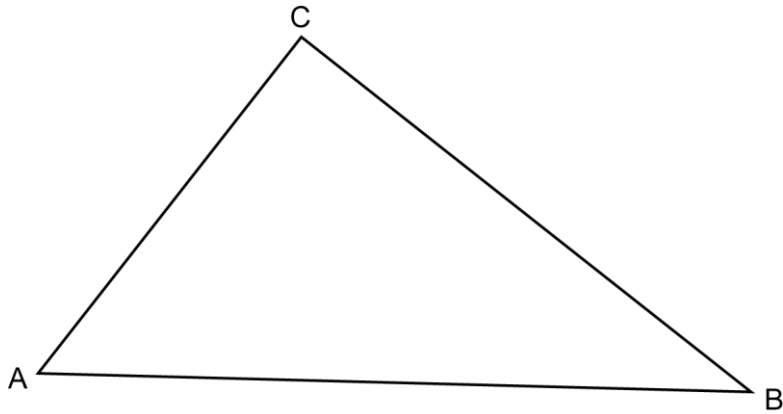
Construct and shade the region within this triangle that is

- nearer to A than to B
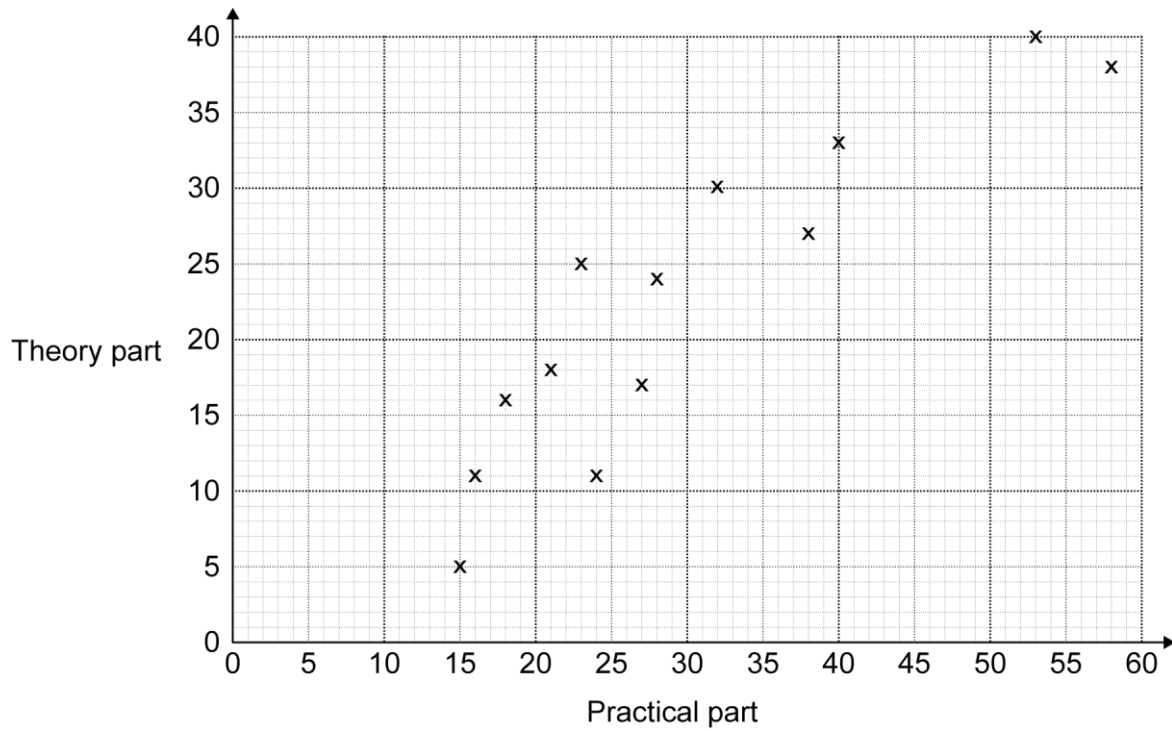- less than 3 cm from C.

Show all your construction lines. **[5]**

(b) Find, by construction, the shortest distance from D to the line EF.
Show all your construction lines.

F

E

•
D

(b) Shortest distance = ... cm **[3]**

4 The scatter diagram shows the results for 13 students in the practical part and the theory part of a test.

(a) The table shows the results for two more students.

Practical part	50	33
Theory part	34	28

Plot these two results on the scatter diagram. **[1]**

(b) The pass marks for the test are 40 in the practical part and 30 in the theory part.

What percentage of the 15 students passed both parts?
Write your answer correct to the nearest whole number.

(b) ....% **[4]**

(c) **(i)** Draw a line of best fit on the scatter diagram. **[1]**

(ii) Hannah scored 48 in the practical part, but missed the theory part.

Estimate a score for Hannah in the theory part.

(c)(ii) ....**[1]**

(iii) Explain why your answer to part **(ii)** may not be correct.

....

....**[1]**

5 A pattern of six coloured tiles is shown below.

Red	Red	Blue
Grey	Blue	Blue

Each tile is a square of side 10 cm.

(a) Jan has a rectangular wall, 2.4 m high and 2.7 m long.
She wants to repeat this pattern over her wall.

How many tiles of each colour does she need?

(a) .... red tiles

.... blue tiles

.... grey tiles
[4]

(b) Geoff has a rectangular wall, 2.4 m high and 3.7 m long.
He wants to use the same pattern.

Geoff says

I cannot use whole patterns to completely cover my wall.

Explain why Geoff is correct.

....

....**[2]**

6 (a) Factorise.

$$x^2 + 5x - 24$$

(a) ....[2]

(b) Given that $y^{-\frac{1}{2}} \times y^2 = y^n$, find the value of *n*.

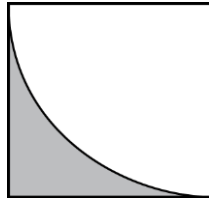**(b)** ....[1]

7 In a group of 46 students

- 28 passed English
- 31 passed science
- 12 did not pass either.

Find the probability that a student selected at random from those who passed science also passed English.
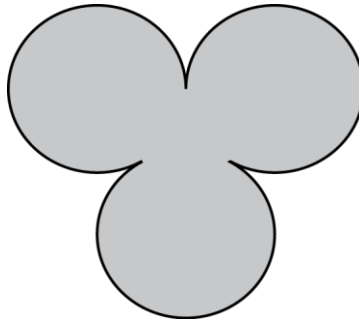
......................................[4]

8   **(a)**   The diagram shows an arc of a circle inside a square of side 6 cm.

        Work out the shaded area.

(a) ....cm^2 **[4]**
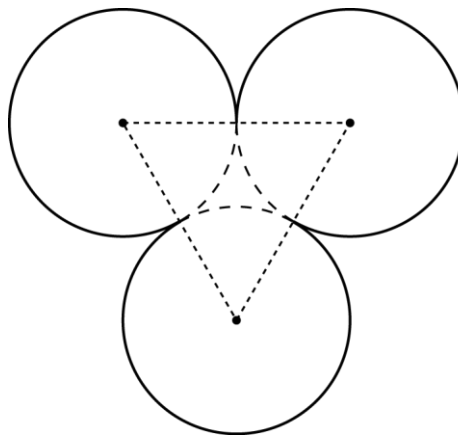
(b) The diagram shows a company logo.

The outline is constructed from three identical circles.
The centre of each circle lies on the corner of an equilateral triangle of side 8 cm.
The radius of each circle is 4 cm.

Not to scale

Show that the perimeter of the logo is 62.8 cm, correct to 3 significant figures. **[5]**

9 James assumes that the population of birds on an island follows this exponential growth model.

$$P = 120\,r^{t}$$

P is the population t years after 1st June 2014.

On 1st June 2014 there were 120 birds.
On 1st June 2015 there were 138 birds.

(a) Show that $r = 1.15$. **[2]**
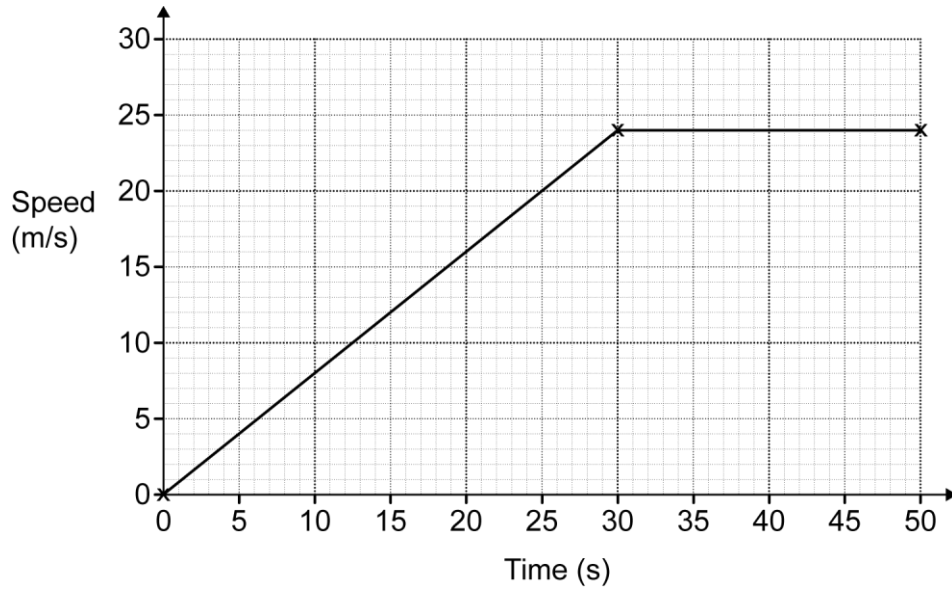
(b) Calculate the population on 1st June 2025.

(b) .... **[2]**

(c) James estimates that the population will be about 6000 by 1st June 2042.

Explain why he might be wrong.

....

....**[1]**

10 (a) The graph shows the speed of a car during 50 seconds of motion.

(i) What is the speed after 20 seconds?

(a)(i)..................................... m/s **[1]**

(ii) Find the acceleration for the first 30 seconds.

(ii) ....m/s² **[2]**

(iii) Work out the distance the car travelled during the 50 seconds.

(iii) ....m **[3]**

(iv) Work out the average speed of the car, in kilometres per hour, during the 50 seconds.

(iv) .... km/h **[3]**

(b) This graph shows the distance travelled by a van.
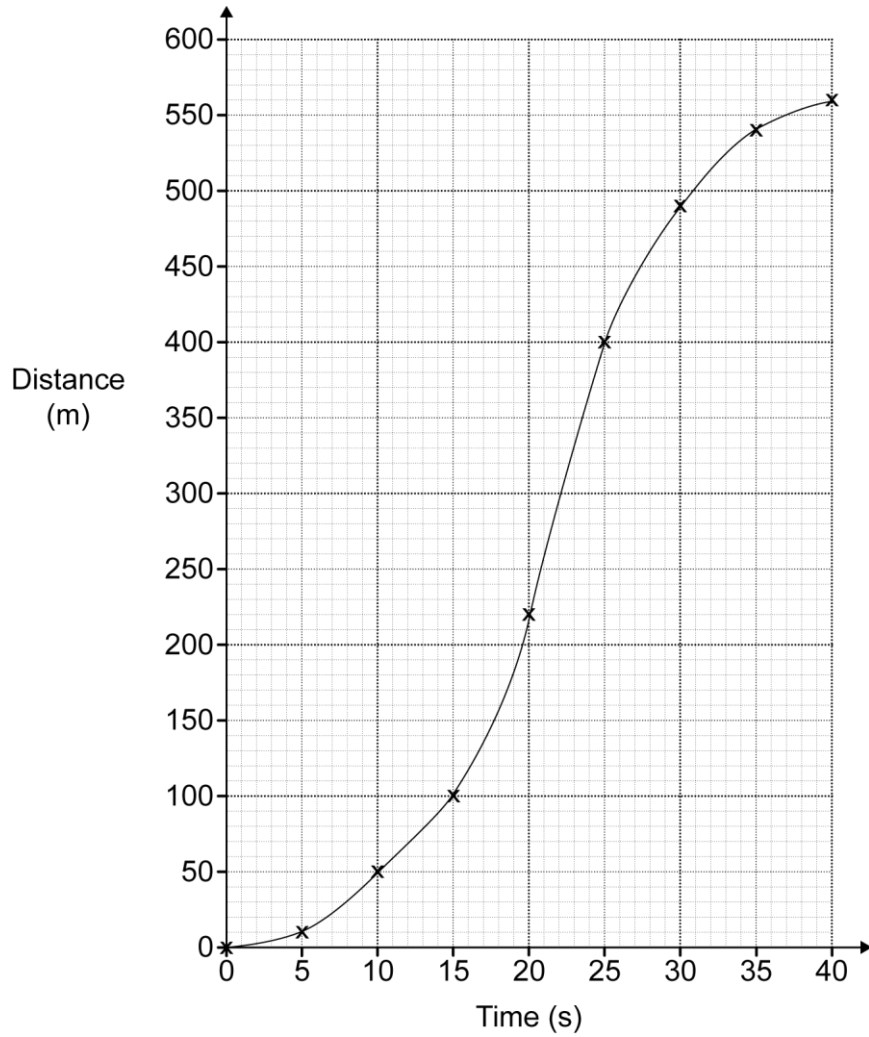
(i) Find the average speed during the 40 seconds.
Give your answer in metres per second.

(b)(i) .... m/s **[2]**

(ii) Show that the van travels at more than 70 miles per hour on at least one occasion.
Use 1 mile = 1.6 kilometres. **[6]**

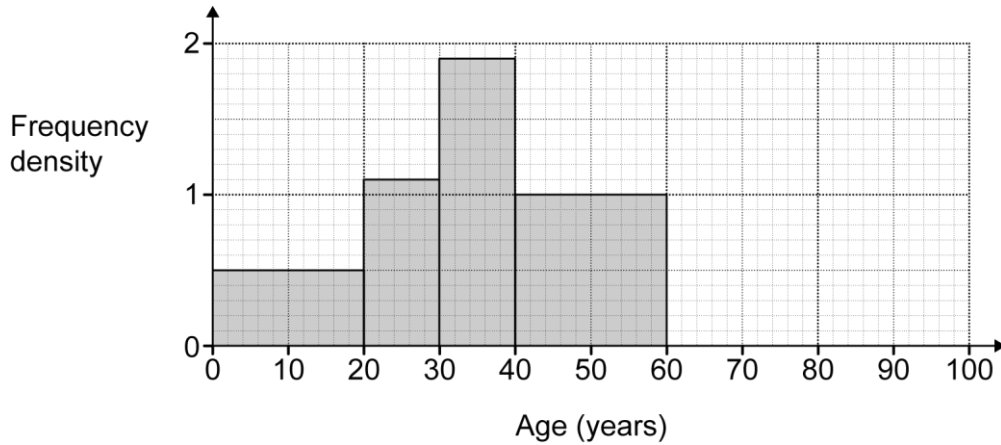**11 (a)** Show that one solution of the equation $x^3 + 2x - 5 = 0$ lies between 1 and 2. **[2]**

(b) Find this solution correct to 1 decimal place.
Show your working.

(b) ....**[4]**

12 Simon records the age of each person entering his village shop one day.
Nobody entering his shop was aged over 100.
This histogram summarises some of his results.

(a) 84 people enter his shop that day.

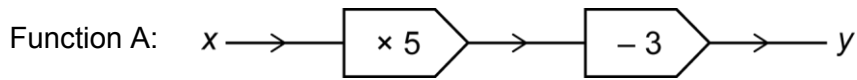Draw the bar for the 60 to 100 age group.
Show your working. **[5]**

(b) The average age in the UK in 2015 was 40.
The mean age of Simon's sample is 47.1.
He concludes that people in his village are older on average than those in the UK.

How reliable is his conclusion?

....

....**[1]**

13 Here is a function.

Function A: $x \longrightarrow$ [× 5] $\longrightarrow$ [− 3] $\longrightarrow y$

(a) (i) Work out y when $x = {}^-2$.

(a)(i) ....[1]

(ii) Work out x when $y = 72$.

(ii) ....[1]

(iii) Find the inverse of function A. **[2]**

Here is another function.

Function B: $x \longrightarrow$ [× d] $\longrightarrow$ [+ e] $\longrightarrow y$
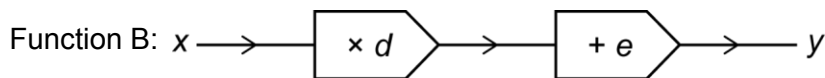
(b) The diagram below shows a composite function.

$m \longrightarrow$ [Function A] $\longrightarrow$ [Function B] $\longrightarrow n$
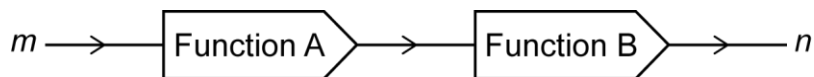
When $m = 4$, $n = 53$.
When $m = 9$, $n = 128$.

Find the values of d and e.

(b) $d =$ ....

$e =$ .... **[4]**

14 The table shows the membership of a tennis club by category.

	Junior	Adult
Female	5	11
Male	7	14

A junior captain and an adult captain are to be chosen.
It is decided that one should be female and one should be male.

How many different outcomes are possible?

....**[4]**

15 (a) Here are the first four terms of a sequence.

$$u_1 = 1 \qquad u_2 = \sqrt{3} \qquad u_3 = 3 \qquad u_4 = 3\sqrt{3}$$

Find the terms u_6, u_9 and u_{21}.

(a) u_6 = ...

u_9 = ...

u_{21} = ... **[3]**

(b) Here are the first four terms of a quadratic sequence.

$$w_1 = 6 \qquad w_2 = 14 \qquad w_3 = 28 \qquad w_4 = 48$$

The nth term is $w_n = an^2 + bn + c$.

Find the values of a, b and c.

(b) a = ...

b = ...

c = ... **[4]**

END OF QUESTION PAPER