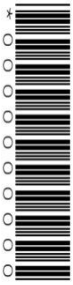


GCSE (9–1) Mathematics J560/06 Paper 6 (Higher Tier)

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.

Answer **all** the questions.

1 (a) Calculate.

$$\sqrt[3]{\frac{4.59}{3.04 - 1.87}}$$

Give your answer correct to 2 decimal places.

(a)..... [2]

(b) $\sqrt{(1+n)^3} = 27$

(i) Show that $(1+n)^3 = 729$. [1]

(ii) Find the value of n .

(b)(ii)..... [1]

2 (a) 12 is one factor of the integer N .

Write down two other factors of N .

(a) and [1]

(b) The integer S is a square number.

Explain why S cannot be a prime number.

.....
 [1]

3 A bag contains 20 balls.
Every ball is red or blue or green.

(a) Anjum takes a ball at random from the bag.
She notes its colour and replaces it.

She repeats this process 20 times.
8 of the balls she takes are red.

Anjum says

There are 8 red balls in the bag.

Explain why she may be wrong.

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

(b) Dan takes a ball at random from the bag.
He notes its colour and replaces it.

He repeats this process 120 times.

His results are shown in the table.

Colour	Red	Blue	Green
Frequency	66	47	7

Estimate the number of balls of each colour in the bag.

(b) Red
Blue
Green [3]

4 Karl and Lisa invest £5800 in a savings account.

The account pays a fixed rate of 2.3% per year compound interest for 5 years.

(a) Karl calculates that they will have £5162.98 in the account at the end of 5 years.

Without working out the correct answer, explain how you can tell that Karl's calculation is wrong.

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

(b) Here is Lisa's calculation to work out how much they will have at the end of 5 years.

$$£5800 \times 2.3^5 = £373307.89$$

Explain what Lisa has done wrong.

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

(c) Calculate how much they will have in the account at the end of 5 years.

(c) £ [3]

5 (a) Solve.

$$3x - 4 = \frac{x}{2}$$

(a) $x = \dots\dots\dots$ [3]

(b) Rearrange this formula to make x the subject.

$$y = 3x^2 - 2$$

(b) $\dots\dots\dots$ [3]

6 A person’s maximum heart rate, in beats per minute, can be calculated using this formula.

$$\text{Maximum heart rate} = 220 - \text{age in years}$$

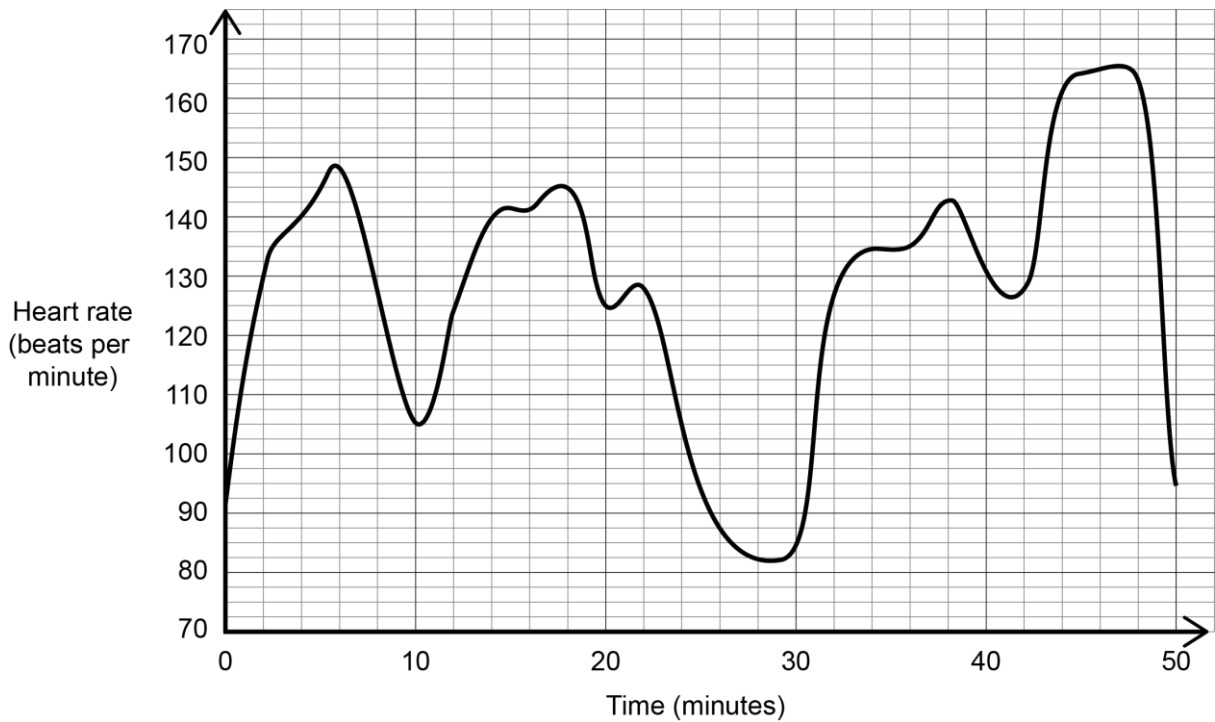
This table gives information about a person’s expected heart rate while they are exercising.

Exercise intensity		Heart rate zone
Exercise zone	Peak	Greater than 85% of maximum heart rate
	Cardio	Between 70% and 85% of maximum heart rate
	Fat burn	Between 50% and 70% of maximum heart rate
Out of exercise zone		Below 50% of maximum heart rate

Zoe is 45 years old.

She wears a heart rate monitor while she is exercising.

The graph shows her heart rate during her exercise session.



(a) Use the formula to calculate Zoe’s maximum heart rate.

(a) beats per minute [1]

(b) Estimate the number of minutes Zoe spent working at **cardio** intensity during this session.

Show clearly how you make your estimate.

(b)..... minutes [4]

(c) Zoe says

My heart rate was in the **exercise zone** for 50 minutes in my session.

Explain why Zoe is not correct.

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

7 Maya is 6 years younger than Ned.
Peter is 3 times as old as Ned.
The sum of their three ages is 109.

Work out Peter's age.

..... [4]

8 A concrete slab is a cuboid.

It measures 400 mm by 400 mm by 28 mm.
The density of the concrete is 2250 kg/m^3 .

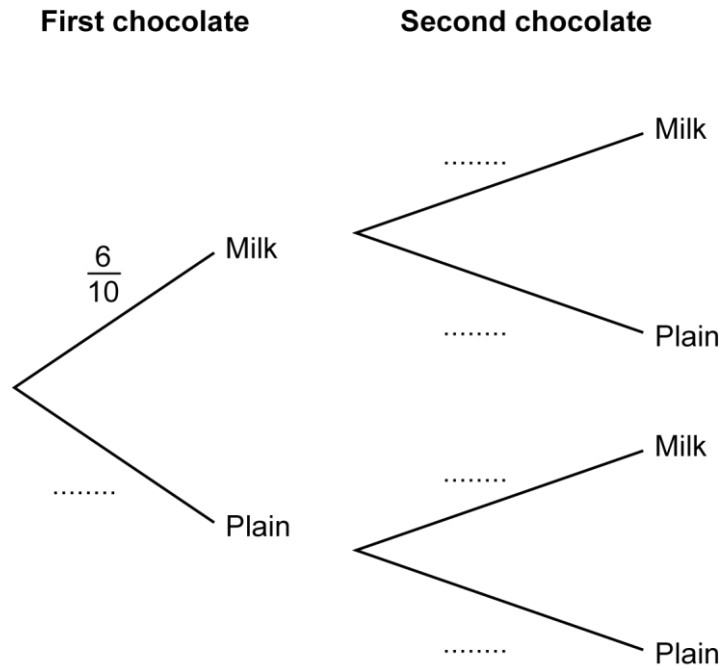
Calculate the total mass of 60 slabs.

..... kg [4]

9 A box contains 6 milk chocolates and 4 plain chocolates.

Maryam takes a chocolate from the box at random and eats it.
She then takes another chocolate from the box at random and eats it.

(a) Complete the tree diagram.



[2]

(b) Work out the probability that Maryam eats one chocolate of each type.
Give your answer as a fraction in its lowest terms.

(b) [3]

10 The table shows the mass of apples produced in some countries in 2014.

All values are given correct to 3 significant figures.

Country	Mass of apples (tonnes)
Denmark	3.54×10^4
France	1.89×10^6
Italy	2.45×10^6
Poland	
UK	

- (a) Poland produced 3 195 300 tonnes of apples.
The UK produced 404 200 tonnes of apples.

Use this information to complete the table.

Write each number in standard form correct to 3 significant figures.

[2]

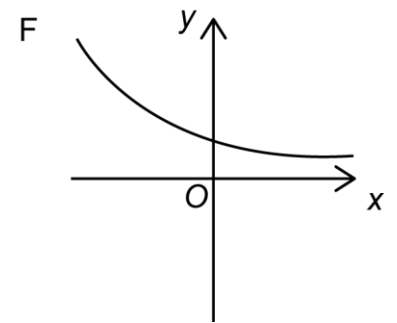
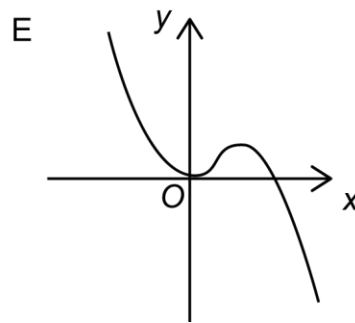
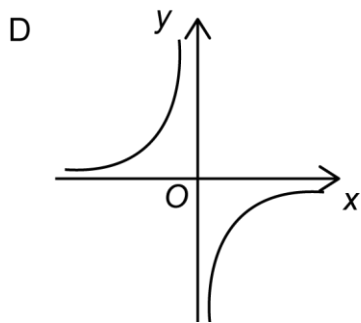
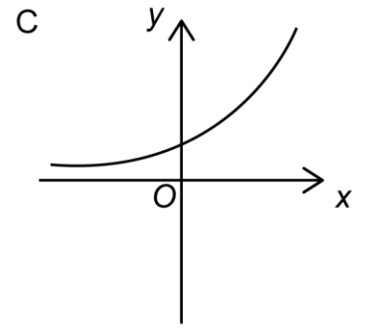
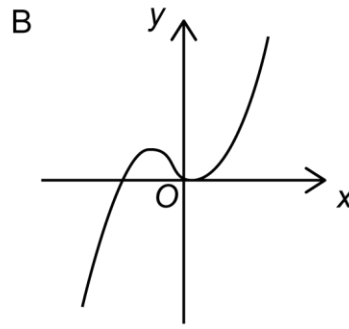
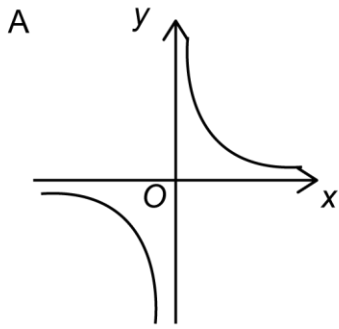
- (b) Write down the mass, in kilograms, of apples produced in Denmark.
Give your answer in standard form.

(b) kg [1]

- (c) Work out the upper bound of the difference between the mass of apples produced in Italy and the mass of apples produced in France.
Give your answer in standard form.

(c) tonnes [3]

11 (a) Here are sketches of the graphs of six functions.



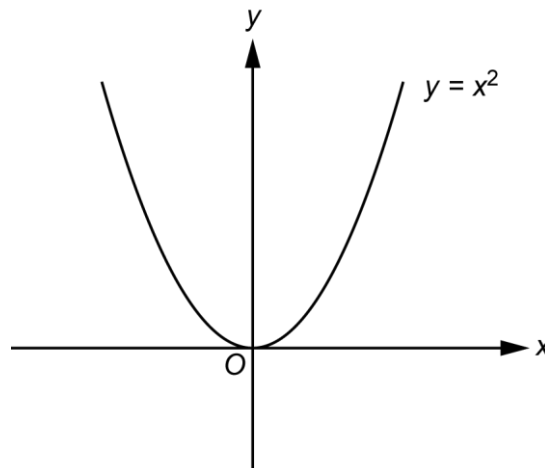
Complete the following statements.

Graph is the graph of $y = 3x^2 - x^3$.

Graph is the graph of $y = 3^{-x}$.

[2]

(b) This is a sketch of the graph of $y = x^2$.



Sketch the graph of $y = (x - 2)^2$ on the same axes.

[1]

12 The table summarises the ages of the 80 employees of a company.

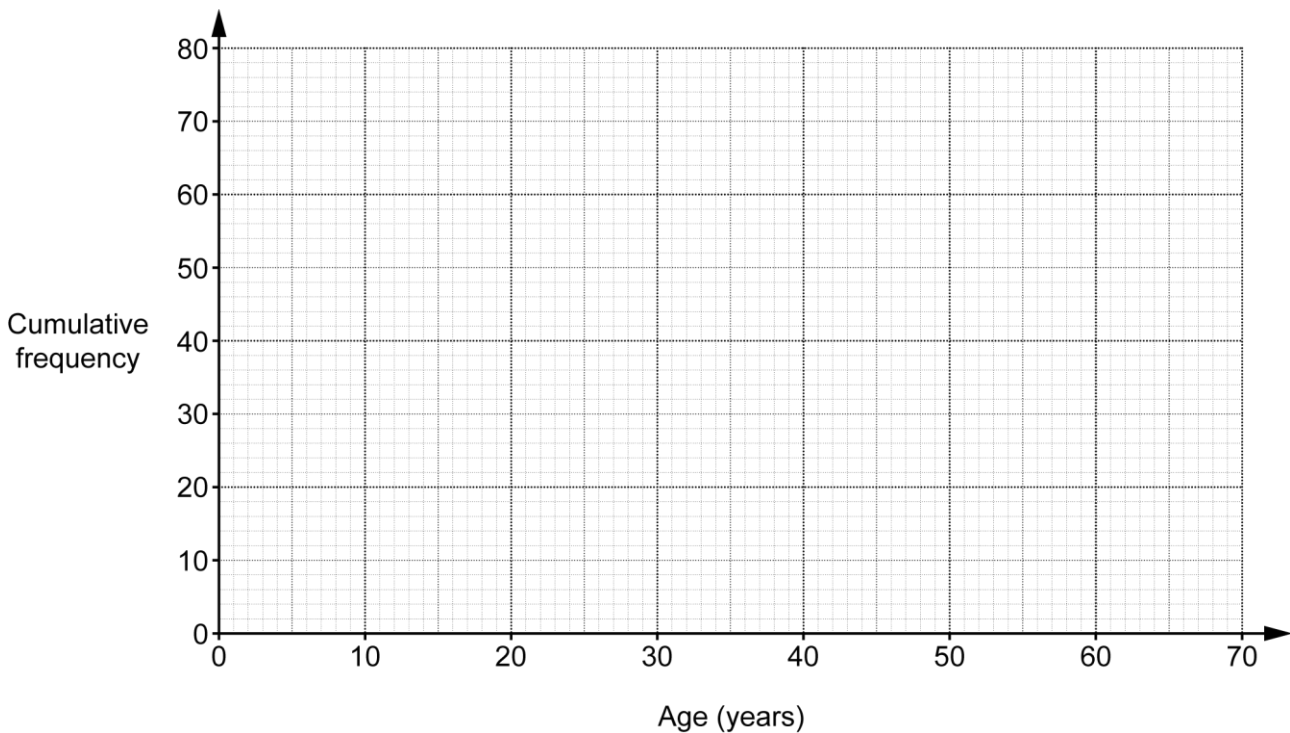
Age, y years	$20 < y \leq 30$	$30 < y \leq 40$	$40 < y \leq 50$	$50 < y \leq 60$	$60 < y \leq 70$
Frequency	10	14	24	23	9

(a) Complete the cumulative frequency table.

Age, y years	$y \leq 20$	$y \leq 30$	$y \leq 40$	$y \leq 50$	$y \leq 60$	$y \leq 70$
Cumulative frequency	0	10				80

[1]

(b) Draw the cumulative frequency graph.



[2]

(c) Ruby says

One quarter of the employees of the company are over 55.

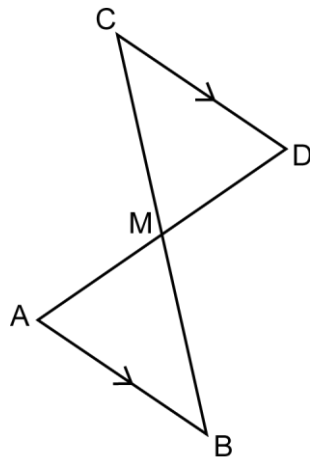
Use the cumulative frequency graph to comment on whether she is correct.

.....
 [2]

13 In the diagram AB is parallel to CD.

AD and BC are straight lines.

M is the midpoint of AD.



Not to scale

Prove that triangle AMB is congruent to triangle DMC.

.....

.....

.....

.....

.....

.....

..... [4]

14 (a) Solve.

$$x^2 - x - 12 \geq 0$$

(a) [3]

(b) The region **R** is defined by these three inequalities, where k is an integer.

$$2y > x + 4$$

$$x + y \leq 5$$

$$x \geq k$$

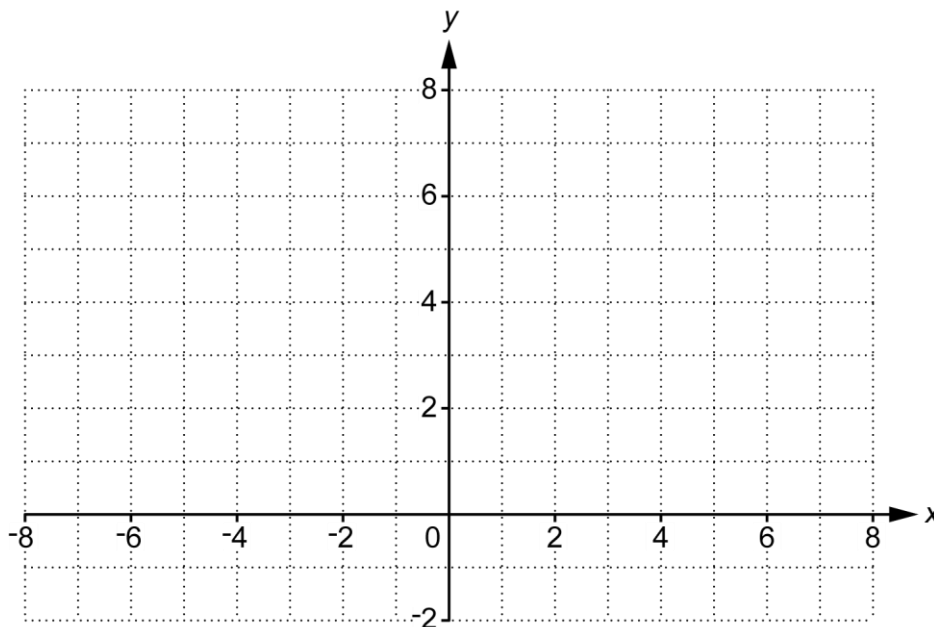
Point P has integer coordinates.

Point P lies in the region **R**.

There are 16 possible positions for point P.

Find the value of k .

Use the grid to help you.



(b) [4]

15 (a) Simplify.

$$\left(\frac{x^4 y}{x^2 y^2}\right)^3$$

(a) [2]

(b) Write as a single fraction in its simplest form.

(i) $x \div \frac{y}{2}$

(b)(i) [1]

(ii) $\frac{4x}{x-2} - \frac{x}{x+3}$

(ii)..... [3]

16 y is inversely proportional to the square of x .

$y = 9$ when $x = 4$.

(a) Find y when $x = 10$.

(a)..... [3]

(b) Calculate the percentage increase in y when x is decreased by 20%.

(b)% [3]

17 A is the point (3, 2), B is the point (7, 4) and C is the point (10, -2).

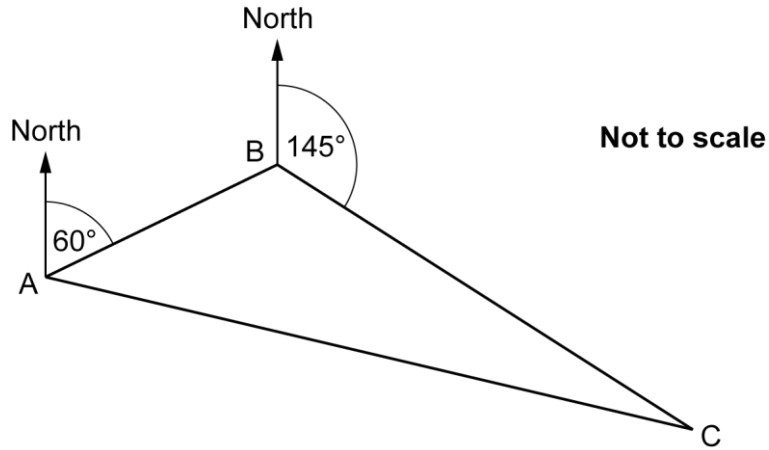
(a) Show that AB is perpendicular to BC.

[4]

(b) Calculate the length of the hypotenuse of triangle ABC.

(b) **[4]**

18 The sketch shows Jim's walking route.



B is 2.8 km from A on a bearing of 060° .
 C is 6.2 km from B on a bearing of 145° .

Jim walks at a speed of 5 km/h.

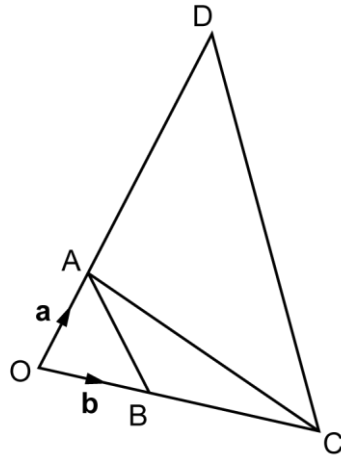
- (a) Calculate the time Jim takes to walk from A to B to C and straight back to A.
 Give your answer in hours and minutes.

(a) hours minutes [6]

- (b) State one assumption you made in part (a).
 Explain how this affected your answer.

.....
 [2]

19 In the diagram, A is a point on OD and B is a point on OC.



Not to scale

$\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$.
 $OA = \frac{1}{4} OD$ and $OB = \frac{1}{3} OC$.

(a) Find \vec{CD} .
 Give your answer in its simplest form in terms of \mathbf{a} and \mathbf{b} .

(a)..... [2]

(b) E is the point such that $\vec{AE} = 3\mathbf{b} + 2\mathbf{a}$.
 Show that ACED is a parallelogram.

.....
 [5]

END OF QUESTION PAPER

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