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9927811861

MATHEMATICS **0580/22**

Paper 2 (Extended) **May/June 2024**

1 hour 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages.

[Turn over

1 The temperature at midnight is −4 °C.
The temperature at noon is 25 °C.

Work out the difference between these two temperatures.

..... °C [1]

2 A gardener charges $6.55 for each hour he works plus a fixed charge of $15.50 .

Calculate the total amount he charges when he works for 4 hours.

$ ..... [2]

3 A delivery driver records the number of pizzas she delivers each month for one year.

48	44	39	28	57	22
36	41	54	57	49	52

(a) Complete the stem-and-leaf diagram.

2	
3	
4	
5	

Key: 4 | 8 represents 48 pizzas

[2]

(b) Find the median.

..... [1]

4 Jonah has \$750.
He spends $\frac{1}{4}$ of this money on travel and some of this money on food.
He now has \$437.50 .

Work out the fraction of the \$750 he spends on food.

..... [3]

5 The table shows part of a tram timetable.

Newpoint	Westhill
10 30	11 17
12 18	
13 30	14 17

All the trams take the same number of minutes to complete the journey from Newpoint to Westhill.

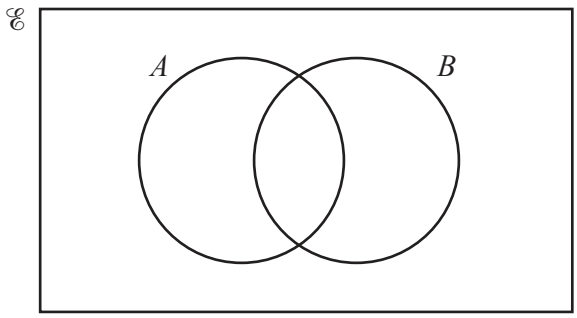
Complete the table.

[2]

6 Write 0.04628 correct to 2 significant figures.

..... [1]

7



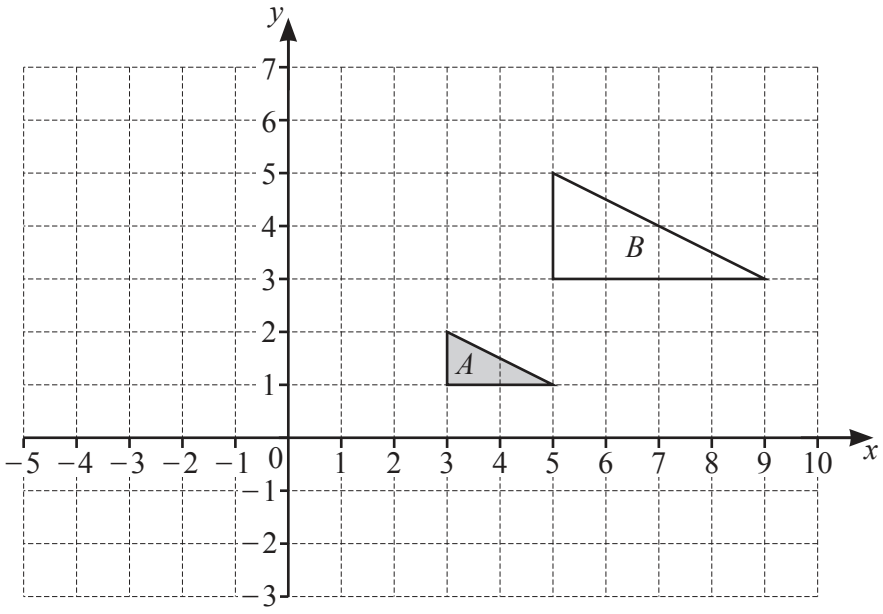
On the Venn diagram, shade the region $A \cup B$. [1]

8 Kai invests \$5000 in an account paying simple interest at a rate of r% per year.
At the end of 8 years, the value of his investment is \$5700.

Find the value of r.

$r =$ ..... [3]

9



(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(b) On the grid, draw the image of triangle A after a translation by the vector $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$. [2]

10 Write 174 000 in standard form.

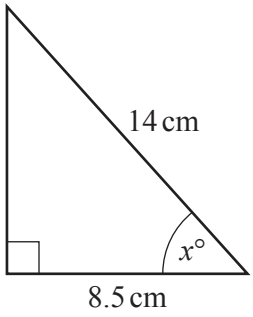
..... [1]

11 A company surveys 40 of its employees.
In the survey, 3 employees say they walk to work.
The company has a total of 1240 employees.

Find the expected number of employees in the company who walk to work.

..... [2]

12



NOT TO SCALE

The diagram shows a right-angled triangle.

Calculate the value of x.

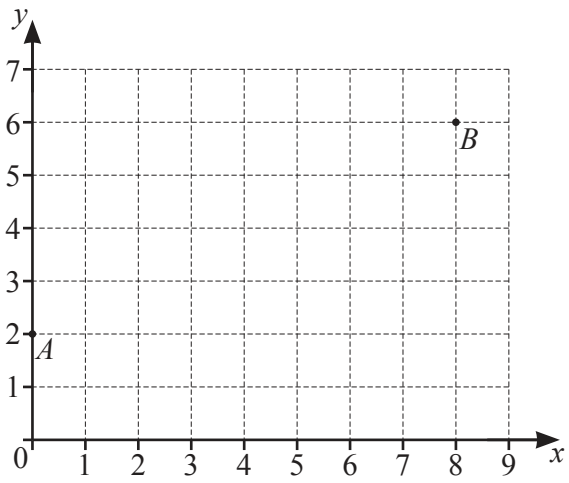
$x =$ ..... [2]

13 **Without using a calculator**, work out $2\frac{1}{4} \div 1\frac{7}{8}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

14



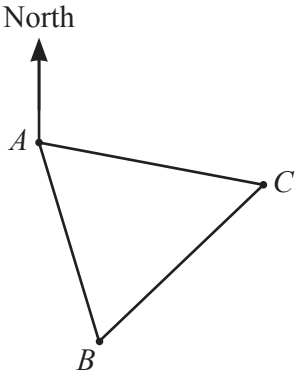
A is the point (0, 2) and B is the point (8, 6).

Find the equation of line AB.

Give your answer in the form $y = mx + c$.

$y =$ ..... [2]

15



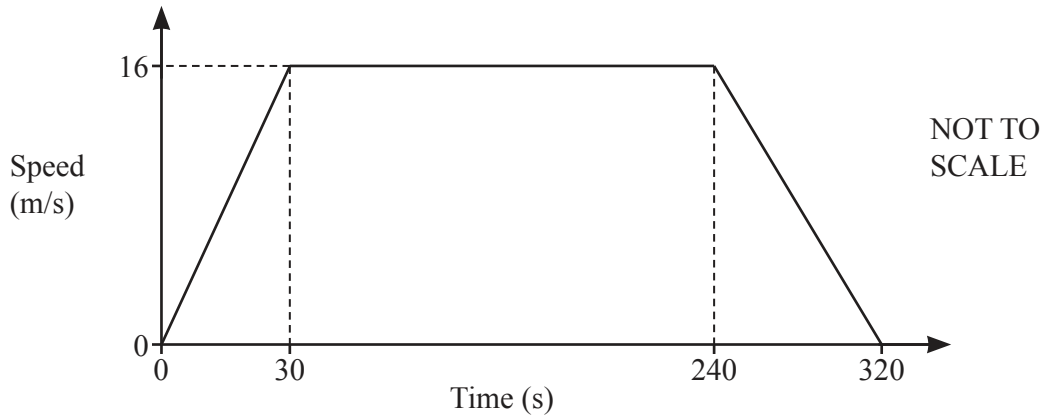
NOT TO SCALE

Three towns, A, B and C, are equidistant from each other.
The bearing of C from A is 104°.

Calculate the bearing of B from C.

..... [3]

16 The speed–time graph shows information about a car journey.



(a) Find the deceleration of the car between 240 and 320 seconds.

..... m/s^2 [1]

(b) Calculate the total distance the car travels during the 320 seconds.

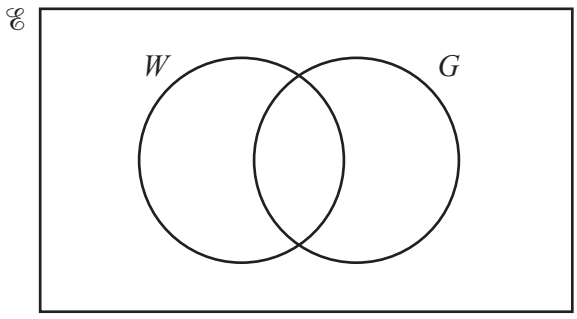
..... m [3]

17 W = {students who walk to school}
G = {students who wear glasses}

There are 20 students in a class.

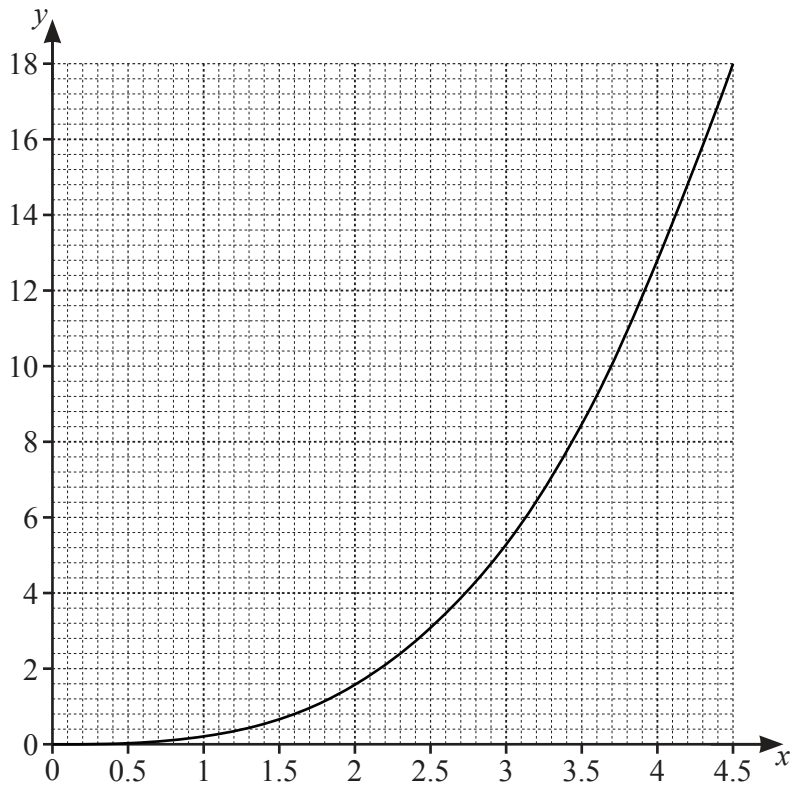
- 8 walk to school
- 3 wear glasses and walk to school
- 2 do not wear glasses and do not walk to school.

Complete the Venn diagram.



[2]

18



The graph of $y = f(x)$ is drawn on the grid.

(a) Draw the tangent to the graph at the point $x = 3$. [1]

(b) Use your tangent to find an estimate for the gradient of the curve at the point $x = 3$.

..... [2]

19 **(a)** y is directly proportional to $(x-1)^2$.
When $x = 4$, $y = 3$.

Find y when $x = 7$.

$y =$ ..... [3]

(b) m is inversely proportional to the square root of p.

Explain what happens to the value of m when the value of p is multiplied by 9.

..... [1]

20 Two parcels are mathematically similar.
The larger parcel has volume $80\,\text{cm}^3$ and height $5.2\,\text{cm}$.
The smaller parcel has volume $33.75\,\text{cm}^3$.

Calculate the height of the smaller parcel.

..... cm [3]

21 Solve the simultaneous equations.
You must show all your working.

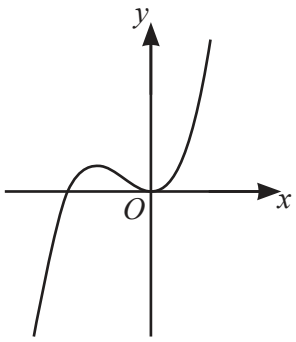
$$4y + 3x = 13$$
$$y = x^2 - 18$$

$x =$ ..... $y =$ .....

or $x =$ ..... $y =$ ..... [5]

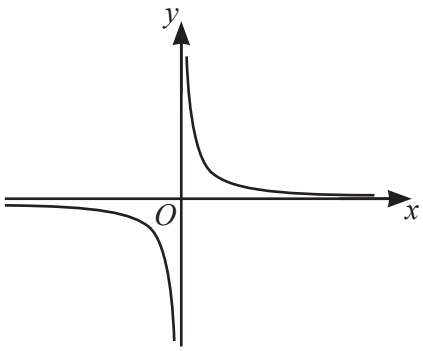
22 **(a)** For each sketch, put a ring around the correct type of function shown.

(i)



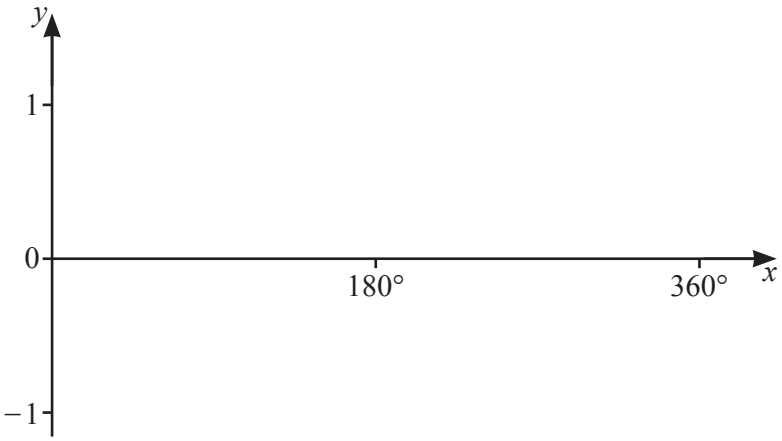
linear cubic quadratic reciprocal exponential [1]

(ii)



linear cubic quadratic reciprocal exponential [1]

(b) **(i)** On the grid, sketch the curve $y = \sin x$ for $0° \leqslant x \leqslant 360°$.

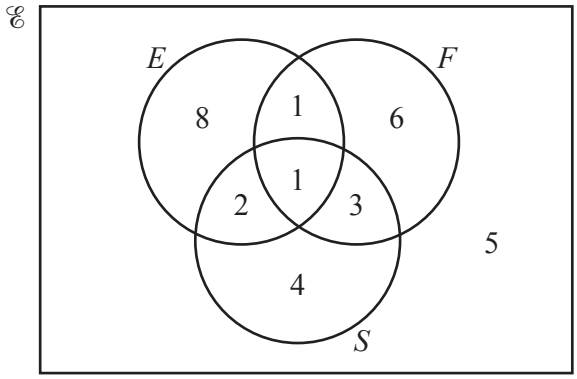


[2]

(ii) Solve the equation $\sin x + 0.4 = 0$ for $0° \leqslant x \leqslant 360°$.

$x =$ ..... or $x =$ ..... [3]

23



The Venn diagram shows information about the number of students in a class.
Some study English (E), some study French (F), some study Spanish (S) and some do not study any of these languages.

(a) Find $\mathrm{n}\left((E \cup F)' \cup S\right)$.

..... [1]

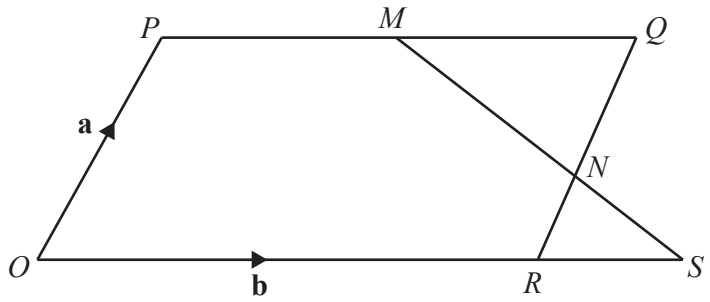
(b) One student is picked at random from those who study Spanish.

Find the probability that this student studies exactly two languages.

..... [2]

Question 24 is printed on the next page.

24



NOT TO SCALE

O is the origin and $OPQR$ is a parallelogram.
M is the midpoint of PQ and N divides QR in the ratio 2 : 1.
$\overrightarrow{OP} = \mathbf{a}$ and $\overrightarrow{OR} = \mathbf{b}$.

(a) Find $\overrightarrow{MN}$.
Give your answer in terms of **a** and/or **b** and in its simplest form.

$\overrightarrow{MN} =$ ..... [2]

(b) The lines MN and OR are extended to meet at S.

Find the position vector of S.
Give your answer in terms of **a** and/or **b** and in its simplest form.

..... [3]