Write your name here

Surname		Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number

Candidate Number

Mathematics

Paper 2 (Calculator)

Aiming for 9

Higher Tier

Spring 2023 Practice Paper
Time: 1 hour 30 minutes

Paper Reference
1MA1/2H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142

  unless the question instructs otherwise.

Information

- The total mark for this paper is 80. There are 22 questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by students achieving Grade 9 in the Summer and November 2022 examinations.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1   Solve $6x^2 + 5x - 6 = 0$

....

(Total for Question 1 is 3 marks)

2   Aaliyah bought a car.

In the first year after she bought the car, its value depreciated at a rate of 23% per annum.
In the second year after she bought the car, its value depreciated at a rate of 19% per annum.

At the end of the second year the car was worth £10 914.75

What was the value of the car when Aaliyah bought it?

£...

(Total for Question 2 is 3 marks)

3   *A* and *B* are points on a centimetre grid.

A is the point with coordinates (−7, 6)
B is the point with coordinates (8, −5)

Work out the length of *AB*.
Give your answer correct to 1 decimal place.

.... cm
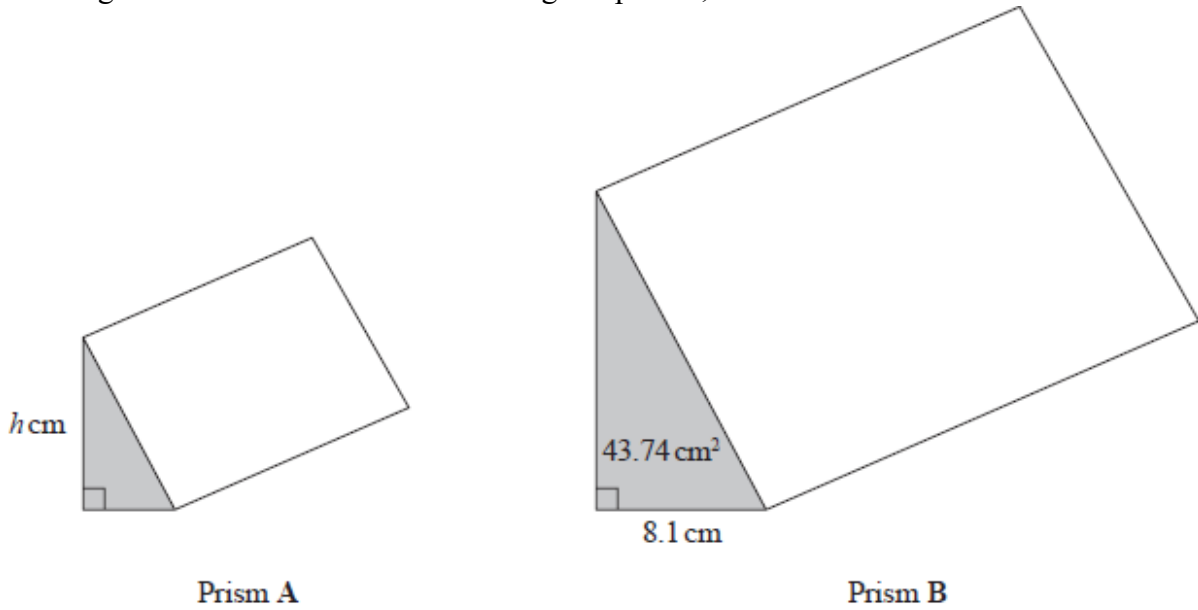
(Total for Question 3 is 2 marks)

4 A, B, C and D are points on the circumference of a circle, centre O.
ADE and BCE are straight lines.
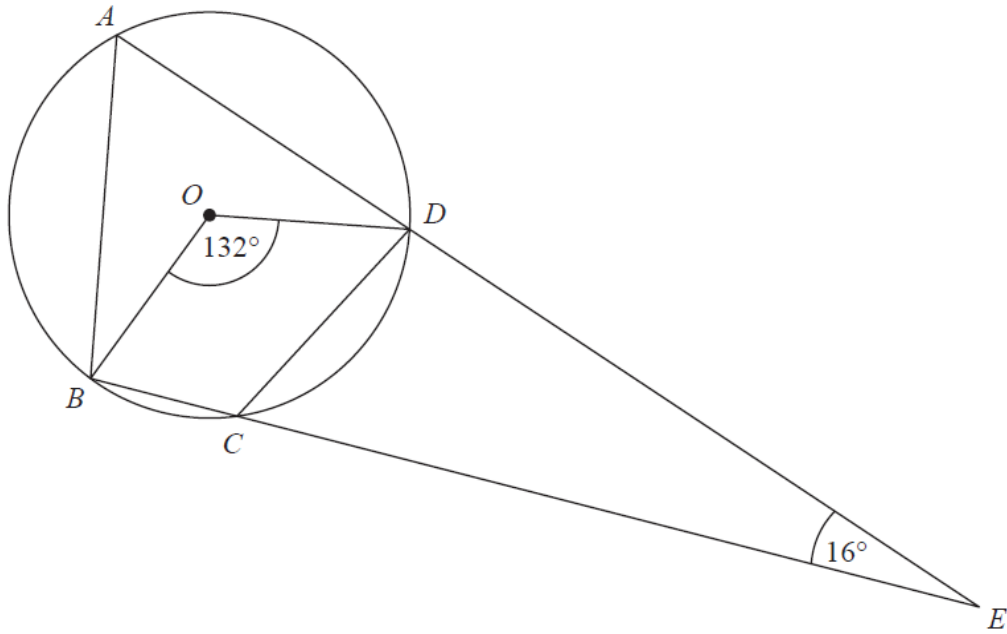
Work out the size of angle CDE.
Give a reason for each stage of your working.

....°

(Total for Question 4 is 4 marks)

5 The diagram shows two similar solid triangular prisms, **A** and **B**.

Prism A

Prism B

h cm

43.74 cm²

8.1 cm

The volume of prism **A** is 58.806 cm³
The volume of prism **B** is 1587.762 cm³
The cross section of each prism is a right-angled triangle.

For prism **B**

the length of the base of the triangle is 8.1 cm
the area of the triangle is 43.74 cm²

The height of the triangle for prism **A** is *h* cm.

Work out the value of *h*.

$h = $ ....

(Total for Question 5 is 4 marks)

6 The points *L*, *M* and *N* are such that *LMN* is a straight line.

The coordinates of *L* are (−3, 1)

The coordinates of *M* are (4, 9)

Given that *LM* : *MN* = 2 : 3,
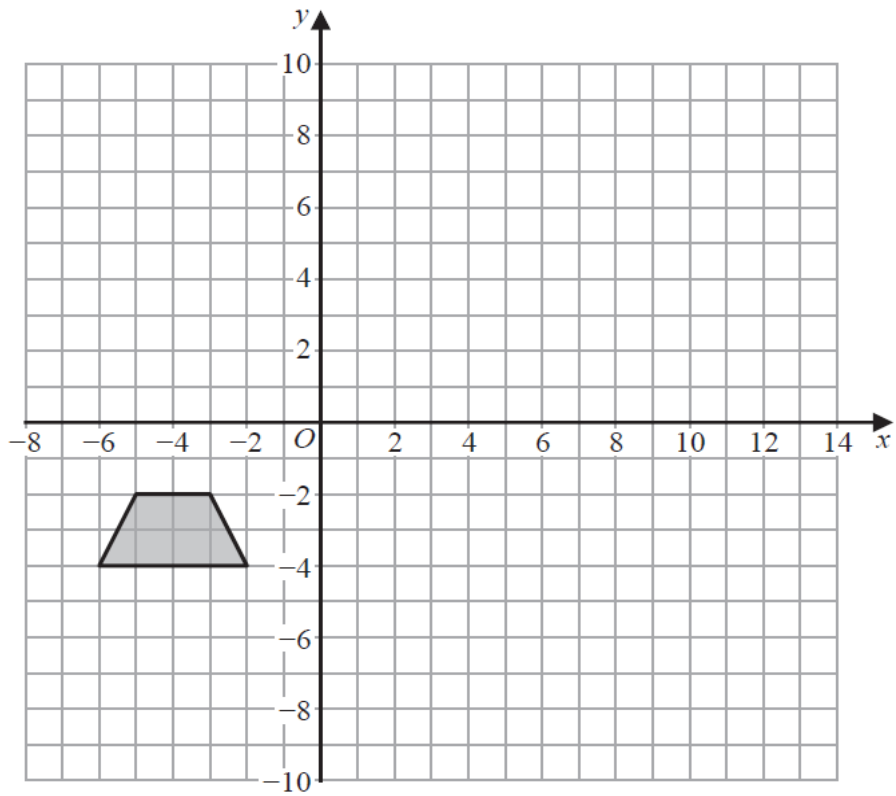
find the coordinates of *N*.

(............. , ...)

(Total for Question 6 is 4 marks)

7

Enlarge the shaded shape by scale factor −2 with centre of enlargement (0, 0)

(Total for Question 7 is 2 marks)

8 A shop manager wants to advertise special offers on social media platforms.

The manager asks 100 customers which of type *A*, type *B* or type *C* they use.

Of these customers,

> 4 use all three types
> 16 do not use any of type *A*, type *B* or type *C*
> 8 use both type *A* and type *B*, but not type *C*
> 14 use both type *B* and type *C*
> 62 in total use type *A*
> all 20 who use type *C* also use at least one of type *A* and type *B*.

(*a*) Complete the Venn diagram for this information.
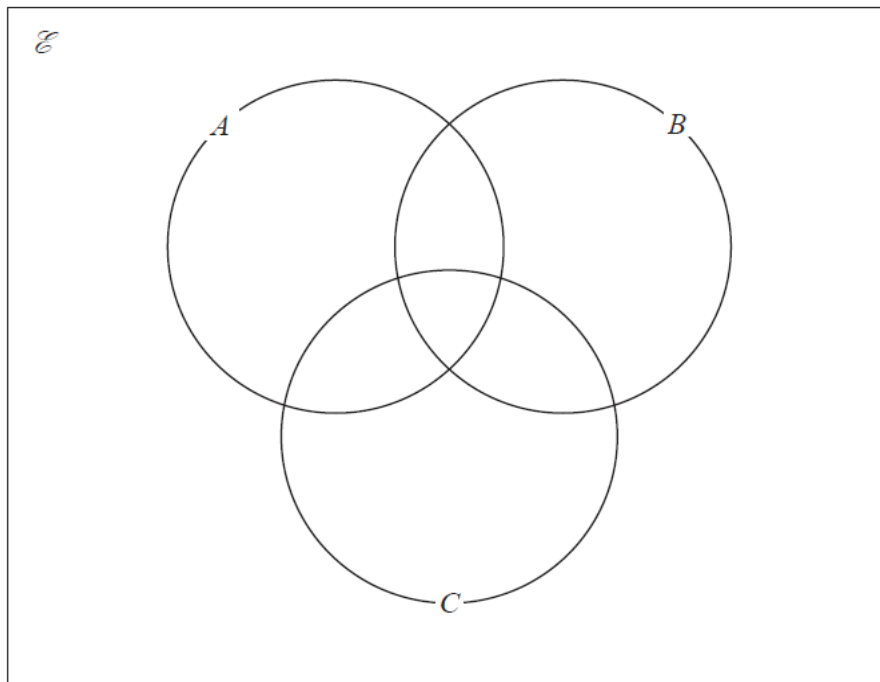
(4)

One of the customers is chosen at random.

Given that this customer uses type *A*,

(*b*) find the probability that this customer also uses type *B*.

....

(2)

(Total for Question 8 is 6 marks)

9 The graph below gives the volume, in litres, of water in a container t seconds after the water starts to fill the container.
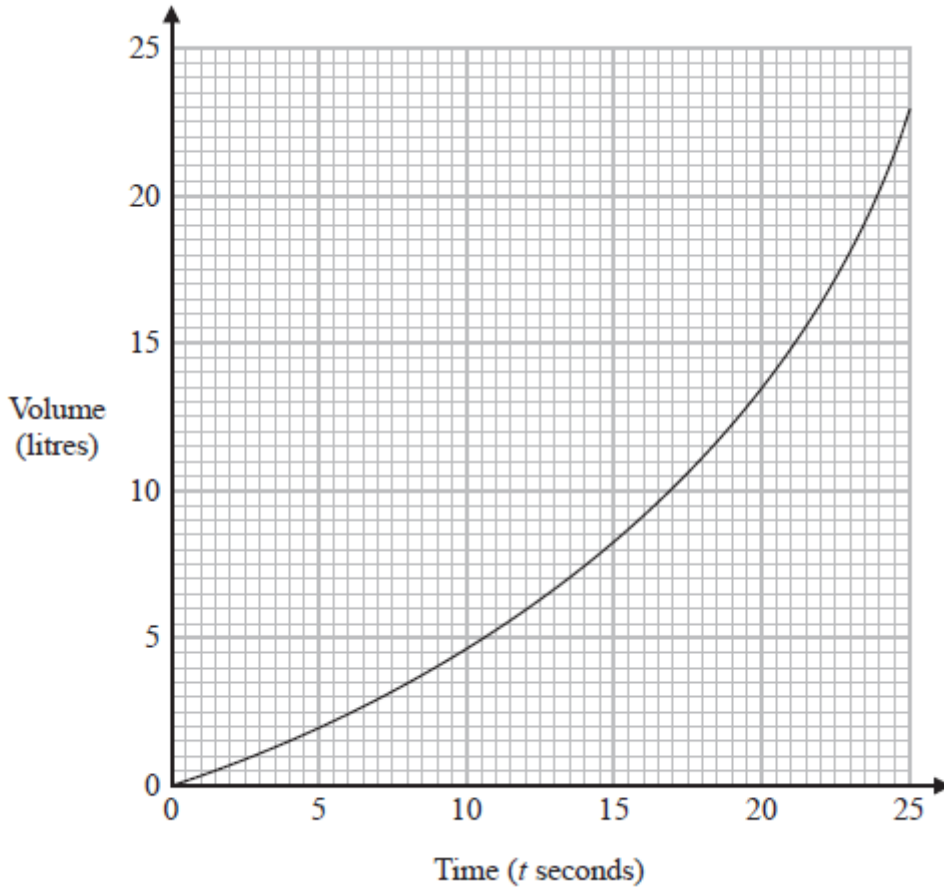
(a) Calculate an estimate for the gradient of the graph when $t = 17.5$
You must show how you get your answer.

....

(3)

(b) Describe fully what the gradient in part (a) represents.

....

....

....

(1)

(Total for Question 9 is 4 marks)

10 The shaded region shown on the grid is bounded by four straight lines.
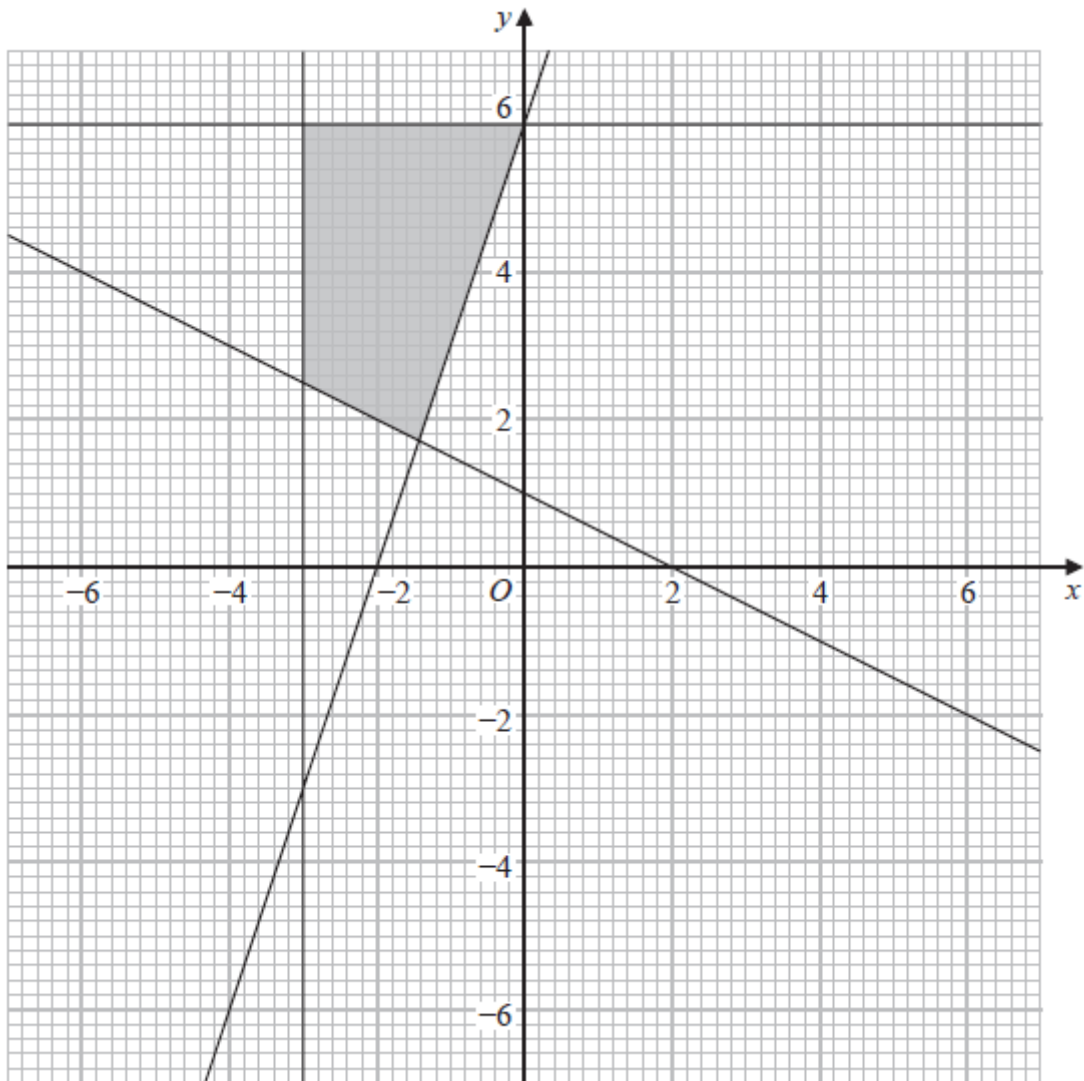
Find the four inequalities that define the shaded region.

....

....

....

....

(Total for Question 10 is 4 marks)

11 $f(x) = \sqrt[3]{x}$

$g(x) = 2x + 3$

$h(x) = fg(x)$

Find $h^{-1}(x)$

$h^{-1}(x) =$ ....

(Total for Question 11 is 3 marks)

12 The number of insects in a population at the start of the year n is P_n

The number of insects in the population at the start of year $(n + 1)$ is P_{n+1} where

$$P_{n+1} = kP_n$$

Given that k has a constant value of 1.13

(*a*) find out how many years it takes for the number of insects in the population to double.
You must show how you get your answer.

....
(2)

The value of k actually increases year on year from its value of 1.13 in year 1

(*b*) How does this affect your answer to part (*a*)?

....

....

....
(1)

(Total for Question 12 is 3 marks)

13 A solid cone is joined to a solid hemisphere to make the solid **T** shown below.
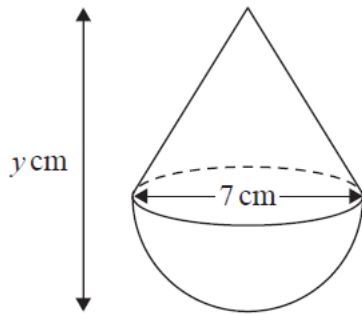
Volume of sphere $= \dfrac{4}{3}\pi r^3$	
Volume of cone $= \dfrac{1}{3}\pi r^2 h$	

The diameter of the base of the cone is 7 cm.
The diameter of the hemisphere is 7 cm.

The total volume of **T** is 120π cm³
The total height of **T** is y cm.

(*a*) Calculate the value of y.
　　Give your answer correct to 3 significant figures.

$y = $ ....

(4)

The diameter of the base of the cone and the diameter of the hemisphere are both increased by the same amount.
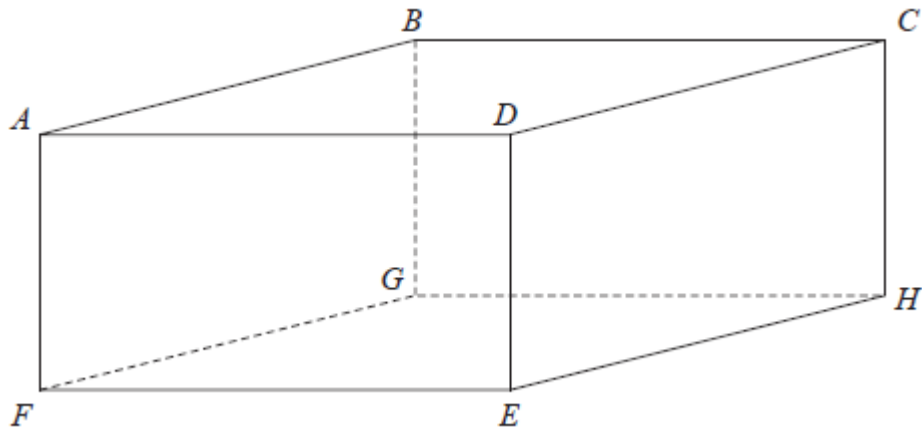Assuming the total volume of **T** does not change,

(*b*) explain the effect this would have on your answer to part (*a*).

....

....

....

(1)

(Total for Question 13 is 5 marks)

14 *ABCDEFGH* is a cuboid.

AD = 9 cm
FD = 13 cm
Angle *GHF* = 49°

Work out the size of angle *FAH*.
Give your answer correct to the nearest degree.

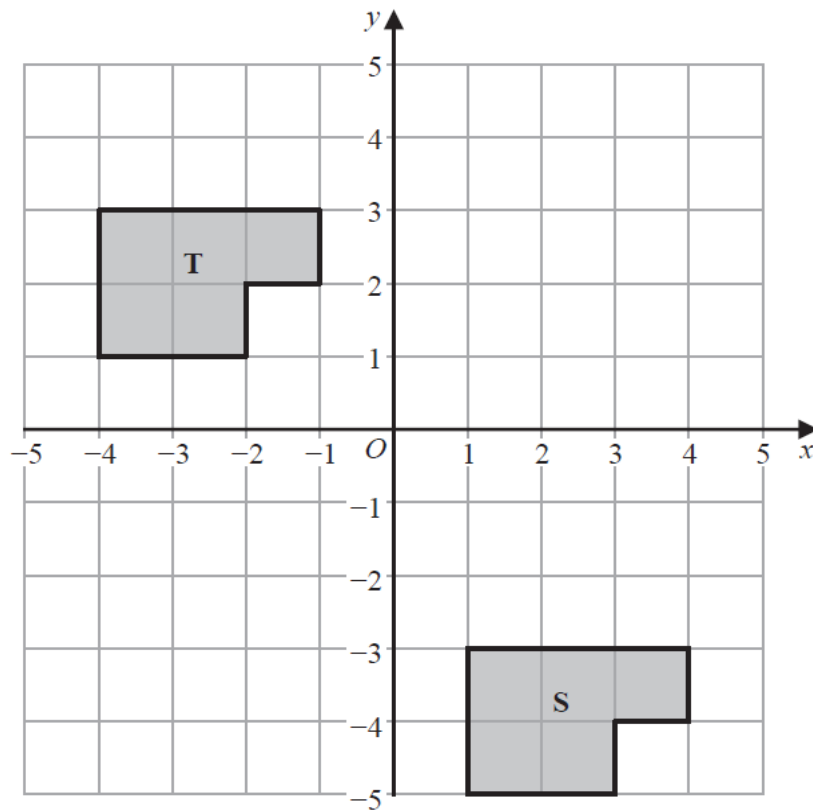..°

(Total for Question 14 is 4 marks)

15   Find algebraically the set of values of x for which

$$x^2 - 49 > 0 \qquad \textbf{and} \qquad 5x^2 - 31x - 72 > 0$$

....

(Total for Question 15 is 5 marks)

16

Describe fully the single transformation that maps shape **S** onto shape **T**.

....

....

....

(Total for Question 16 is 2 marks)

17 The functions g and h are such that

$$g(x) = \sqrt[3]{2x-5} \quad h(x) = \frac{1}{x}$$

(a) Find g(16)

....
(1)

(b) Find $hg^{-1}(x)$

Give your answer in terms of x in its simplest form.

$hg^{-1}(x) = $ ....
(3)

(Total for Question 17 is 4 marks)

18   A circle has equation $x^2 + y^2 = 12.25$

The point P lies on the circle.
The coordinates of P are (2.1, 2.8)

The line **L** is the tangent to the circle at point P.

Find an equation of **L**.
Give your answer in the form $ax + by = c$, where a, b and c are integers.

....
(Total for Question 18 is 4 marks)

19 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5

Both Marta and Khalid get an increase of £1.50 in their hourly pay.
The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11

Work out the hourly pay before the increase for Marta and for Khalid.

Marta £...

Khalid £...

(Total for Question 19 is 4 marks)

**20** A race is measured to have a distance of 10.6 km, correct to the nearest 0.1 km.

Sam runs the race in a time of 31 minutes 48 seconds, correct to the nearest second.
Sam's average speed in this race is V km/hour.

By considering bounds, calculate the value of V to a suitable degree of accuracy.
You must show all your working and give a reason for your answer.
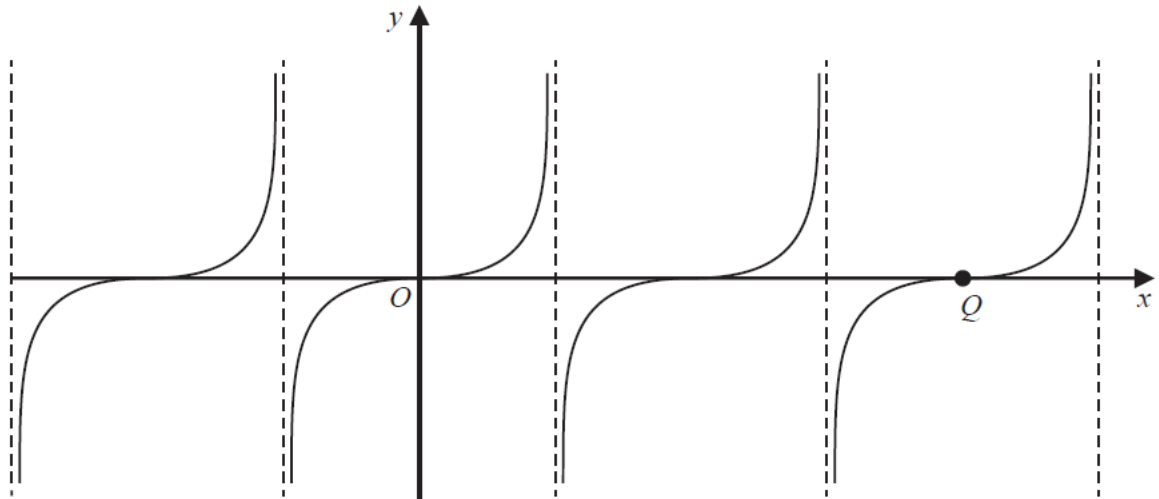
(Total for Question 20 is 5 marks)

21 The graph of $y = f(x)$ is shown on the grid below.

$y = f(x)$
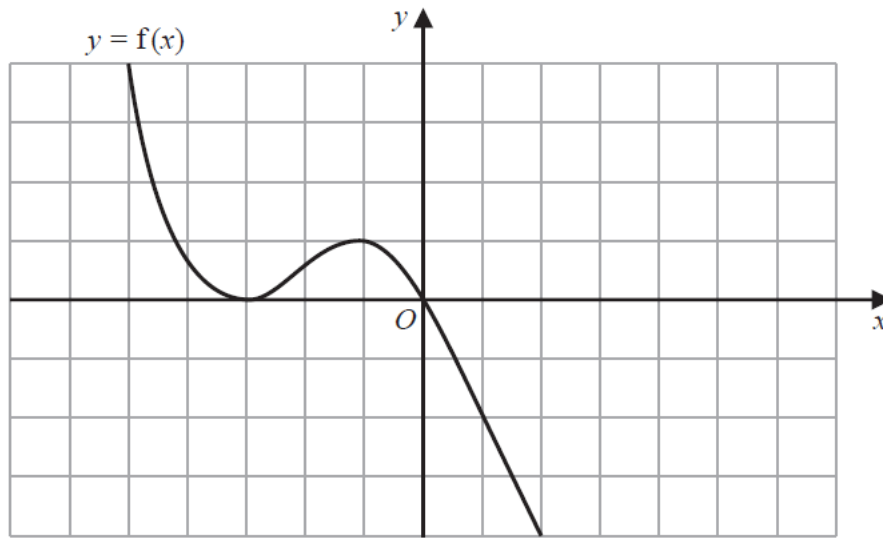
(a) On the grid above, sketch the graph of $y = f(-x)$

(1)

Here is a sketch of the graph of $y = \tan x°$

The graph of $y = \tan x°$ is translated to give the graph of $y = g(x)$

Following the translation the point Q, shown on the graph above, moves to point R.
Point R has coordinates $(90, -5)$

(b) Find an expression for $g(x)$ in terms of x.

....

(2)

(Total for Question 21 is 3 marks)

22 The front elevation and the plan of a solid are shown on the grid.
On the grid, draw the side elevation of the solid from the direction of the arrow.
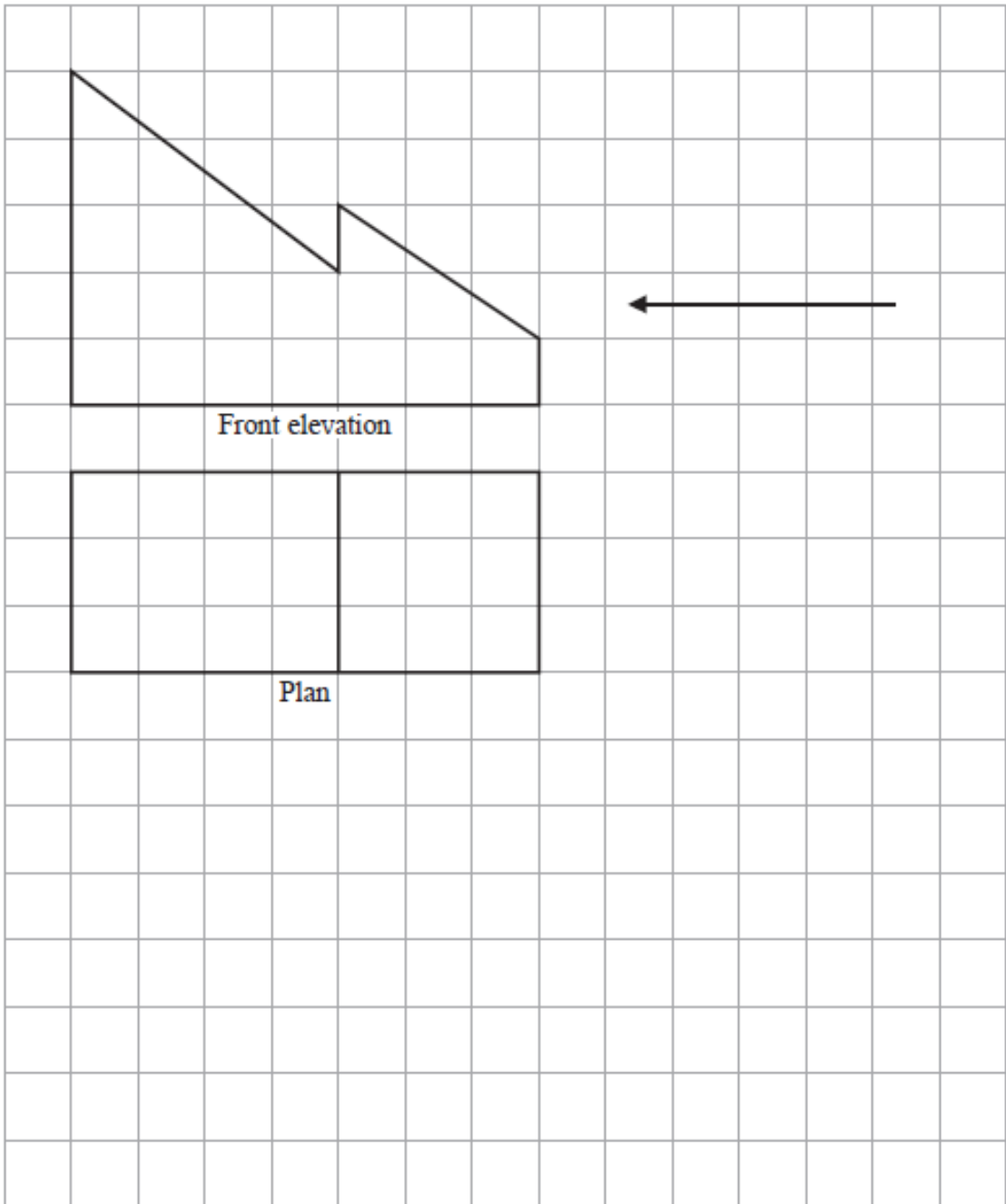
(Total for Question 22 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS