

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

Pi Academy

Predicted Papers - Set 1

Morning (Time: 1 hour 30 minutes)

Mathematics

Paper 2 (Calculator)

Higher Tier

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
- 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.

Turn over ►



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The velocity of an object is given by the formula, $v = \frac{10.31a}{48.9}$

(a) Use this formula to estimate the velocity of the object when $a = 2.3$.

..... m/s

(2)

(b) Will your estimate be bigger or smaller than the actual value?

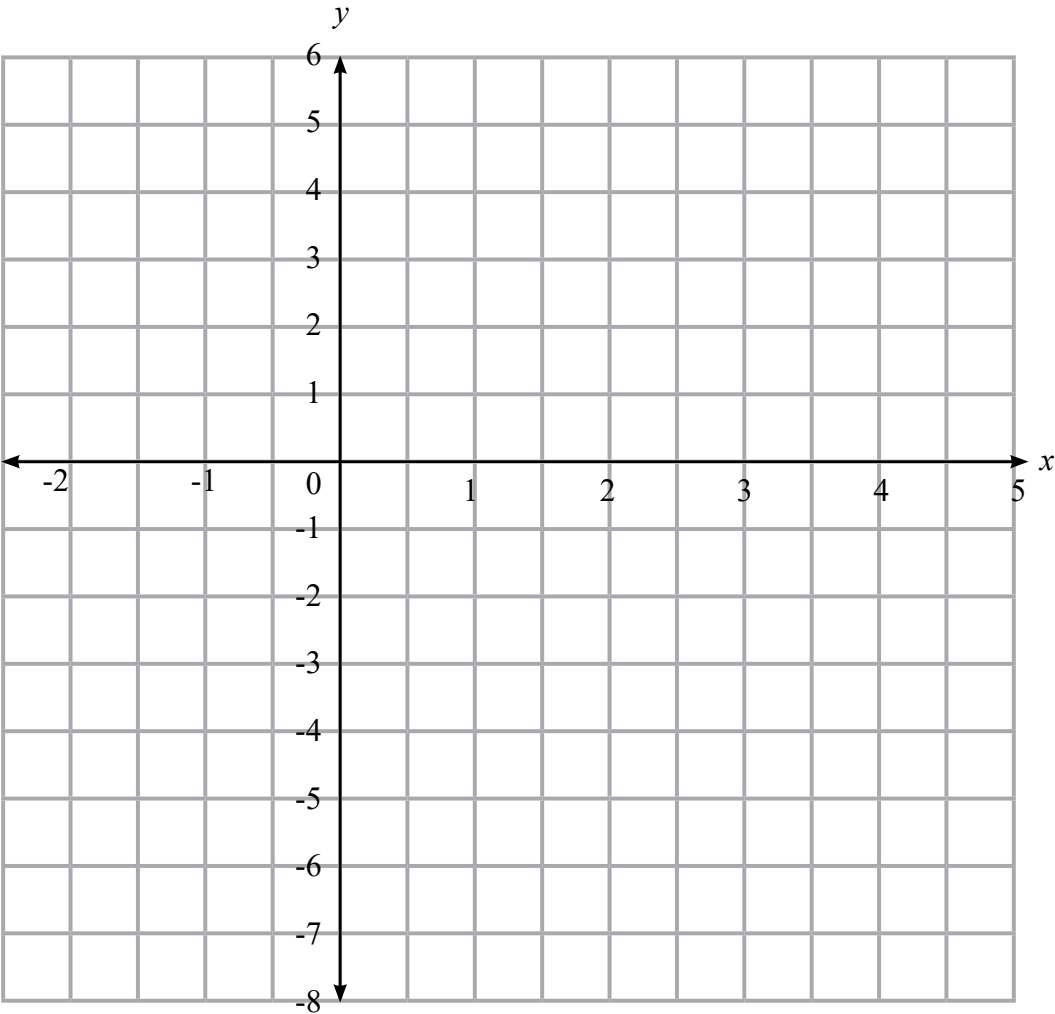
Give reason for your answer.

.....
.....

(1)

(Total for Question 1 is 3 marks)

2 On the grid below, draw the graph of $y + 2x = 3$ for values of x from -1 to 4



(Total for Question 2 is 3 marks)

3 Laura studies similar triangles and congruent triangles.
Laura says,
“All the similar triangles are congruent triangles.”
Is Laura correct ?
Give a reason for your answer.

.....

.....

.....

(Total for Question 3 is 2 marks)

4 A force of 80 Newtons acts on an area of 26 cm².

The force is decreased by 12 Newtons.

The area is decreased by 12 cm².

James says,

“ The pressure increases by less than 60%”

Is James correct?

You must show how you get your answer.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

(Total for Question 4 is 3 marks)

- 5 For all values of x ,
 $f(x) = 4x + 9$ and $g(x) = x^2 - 5$

(a) Find $g(-4)$.

Is $f(0.5) = g(-4)$? Justify your answer.

(2)

(b) Evaluate $gf(x)$

(2)

(Total for Question 5 is 4 marks)

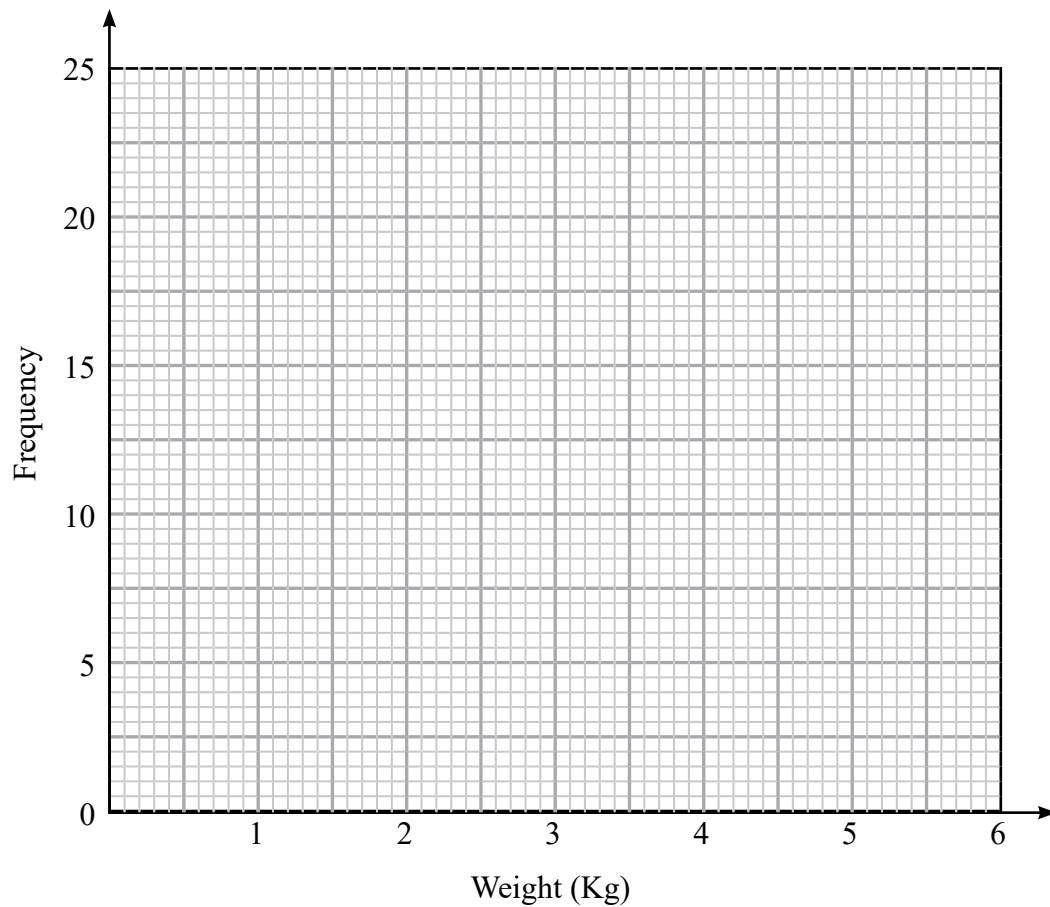
- 6 The table below gives information about the weight, in kg, of some blackbirds.

Weight (Kg)	Frequency
$0 < w \leq 1$	5
$1 < w \leq 2$	7
$2 < w \leq 3$	9
$3 < w \leq 4$	8
$4 < w \leq 5$	4
$5 < w \leq 6$	2

(a) Use the table to find the modal class.

(1)

(b) Draw a frequency polygon to show this information.



(2)

(Total for Question 6 is 3 marks)

7 There are only black balls, blue balls, orange balls and white balls in a bag.

The table shows the probabilities of picking at random a black ball and picking at random a white ball.

Colour	Black	White	Orange	Blue
Probability	0.4	0.22		

The probability of picking a blue ball is the same as the probability of picking an orange ball.
Complete the table.

(Total for Question 7 is 2 marks)

8

Defective Gadgets

1 in 11 Gadgets manufactured
in the year 2001 and 2002
were found defective.

221,100 gadgets were manufactured in the year 2001.

330,000 gadgets were manufactured in the year 2002.

How many more gadgets are expected to be defective in 2002 as compared to 2001?

.....

(Total for Question 8 is 2 marks)

9 $4 - \frac{x+2}{x-2} - \frac{x-6}{x+2}$ can be written as a single fraction in the form $\frac{ax^2 + bx + c}{x^2 - 4}$

where a , b and c are integers.

Work out the value of a , b and c .

$a =$

$b =$

$c =$

(Total for Question 9 is 3 marks)

- 10** For the figure given below, work out the length AD .
Give your answer correct to 2 decimal places.

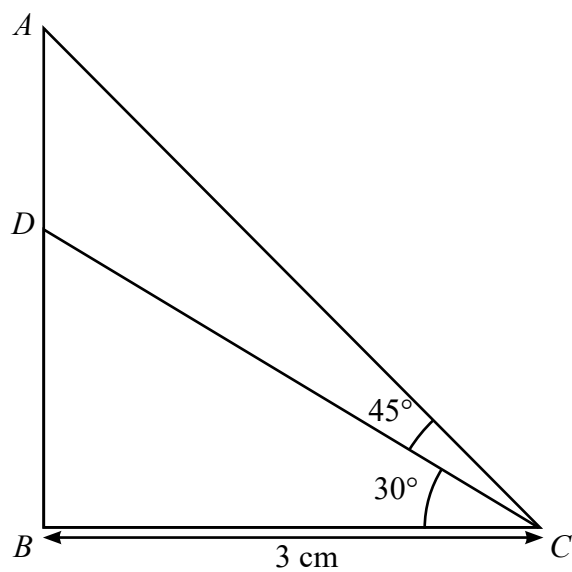
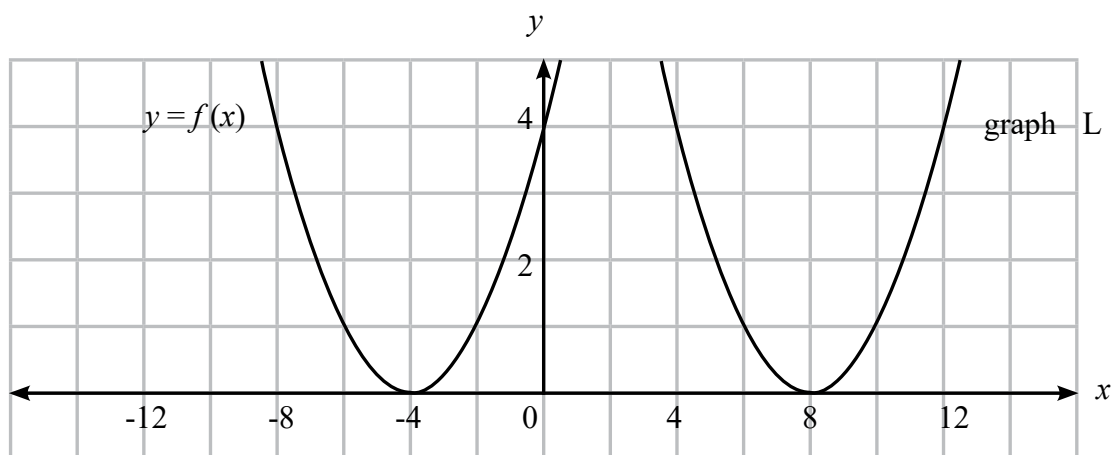


Figure not drawn to scale

.....cm

(Total for Question 10 is 3 marks)

11 The graph of $y = f(x)$ is shown on both grids below.



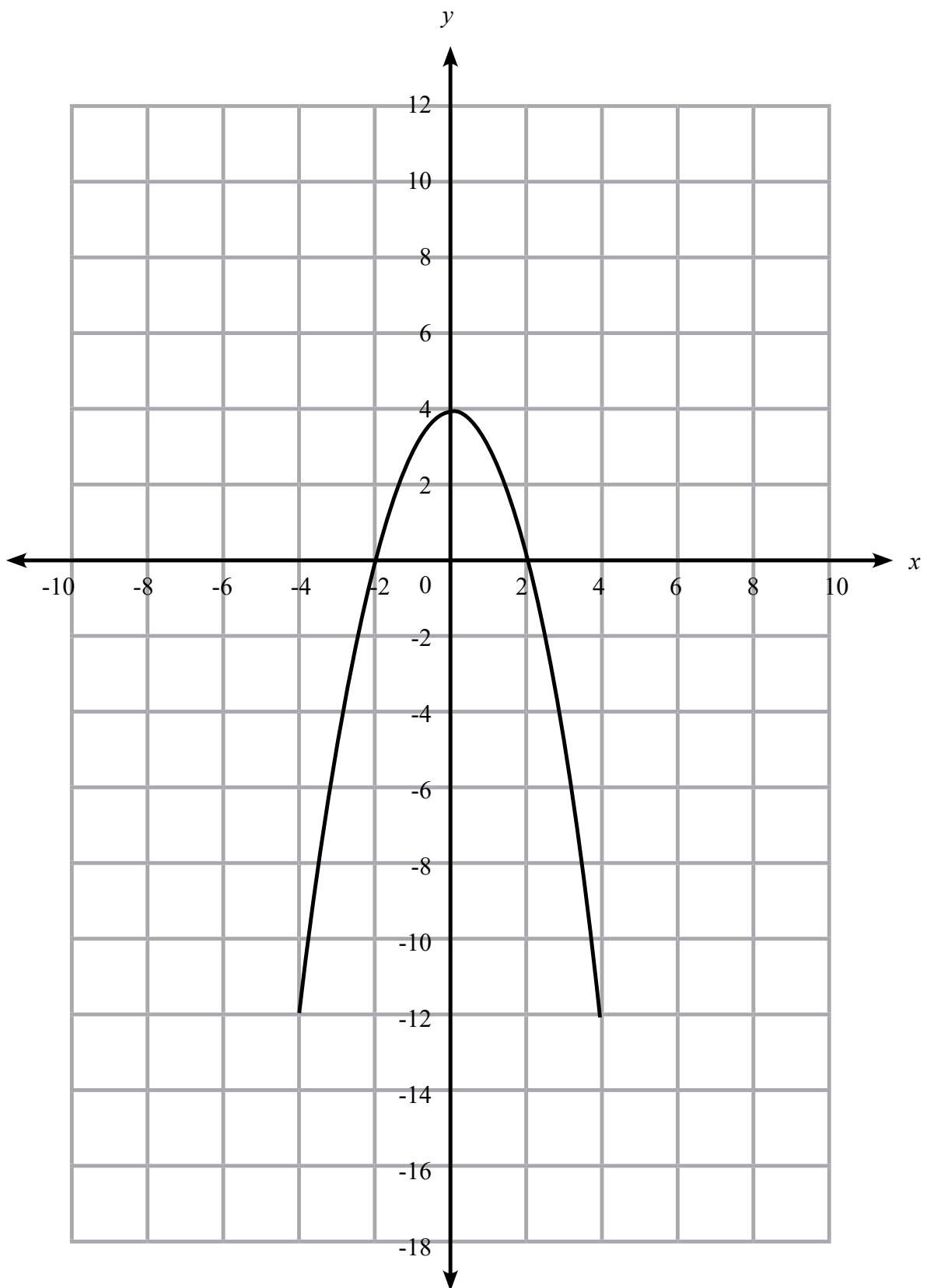
The graph L shown above, is a translation of the graph of $y = f(x)$.

(a) Write down the equation of graph L.

.....

(1)

(b) On the grid below, Sketch the graph of $-f(x) + 4$



(1)

(Total for Question 11 is 2 marks)

12 A sequence of numbers is formed by the iterative process

$$x_{n+1} = -8 - \frac{6}{x_n^2}$$

with $x_0 = -2.7$

Find the values of x_1 and x_2 .

Give your answer correct to 2 decimal places.

$x_1 =$

$x_2 =$

(Total for Question 12 is 2 marks)

13 80 People were asked if they prefer to go on holiday in Greece or in France or in Brazil.

36 of the people were male.

10 of the 16 people who said Greece were female.

12 males said Brazil.

38 people said France.

One of the females is chosen at random.

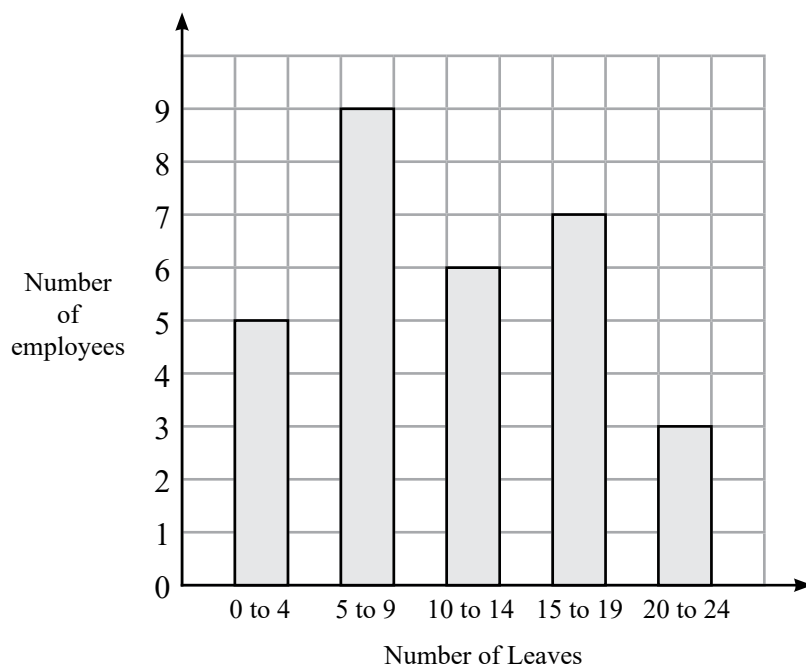
What is the probability that this female said France?

.....

(Total for Question 13 is 4 marks)

14 A manager records the number of leaves taken by each of the 30 employees last year.

The chart below shows information about the number of leaves taken by each of the 30 employees.



Show that an estimate for the mean number of leaves is 11.

You must show all your work.

(Total for Question 14 is 4 marks)

15 £380 is shared between Jack, Jim, Jill and Jones.

The ratio of the amount Jack gets to the amount Jim gets is 2 : 9.

Jill and Jones each get 2 times the amount Jack gets.

Work out the amount of money that Jim gets.

£.....

(Total for Question 15 is 4 marks)

16 (a) Show that $\frac{\sqrt{2}}{\sqrt{2}+3}$ can be written as $\frac{3\sqrt{2}}{7} - \frac{2}{7}$

(2)

(b) Simplify $\sqrt{20} + \sqrt{45}$

.....
(2)

(Total for Question 16 is 4 marks)

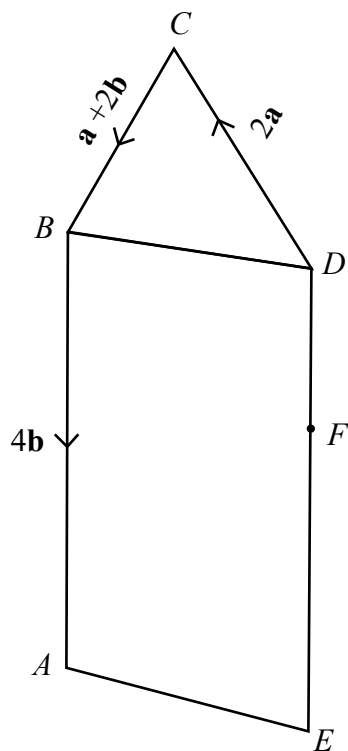
17 Work out the value of x .

$$\frac{x-3}{x+3} - \frac{x+3}{x-3} + 6\frac{6}{7} = 0$$

.....
(Total for Question 17 is 3 marks)

18 In the diagram, AB is parallel to ED and AE is parallel to BD .

F is a point on ED such that $EF : FD = 2 : 1$.



(a) Find vector $\vec{BD}$.

.....

(1)

(b) Find vector $\vec{AF}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

.....

(3)

(Total for Question 18 is 4 marks)

19 Ronnie buys a car for £12000 plus VAT at 25%.

Ronnie pays a deposit for the car, he then pays the rest of the cost in 12 equal payments of £600 each month.

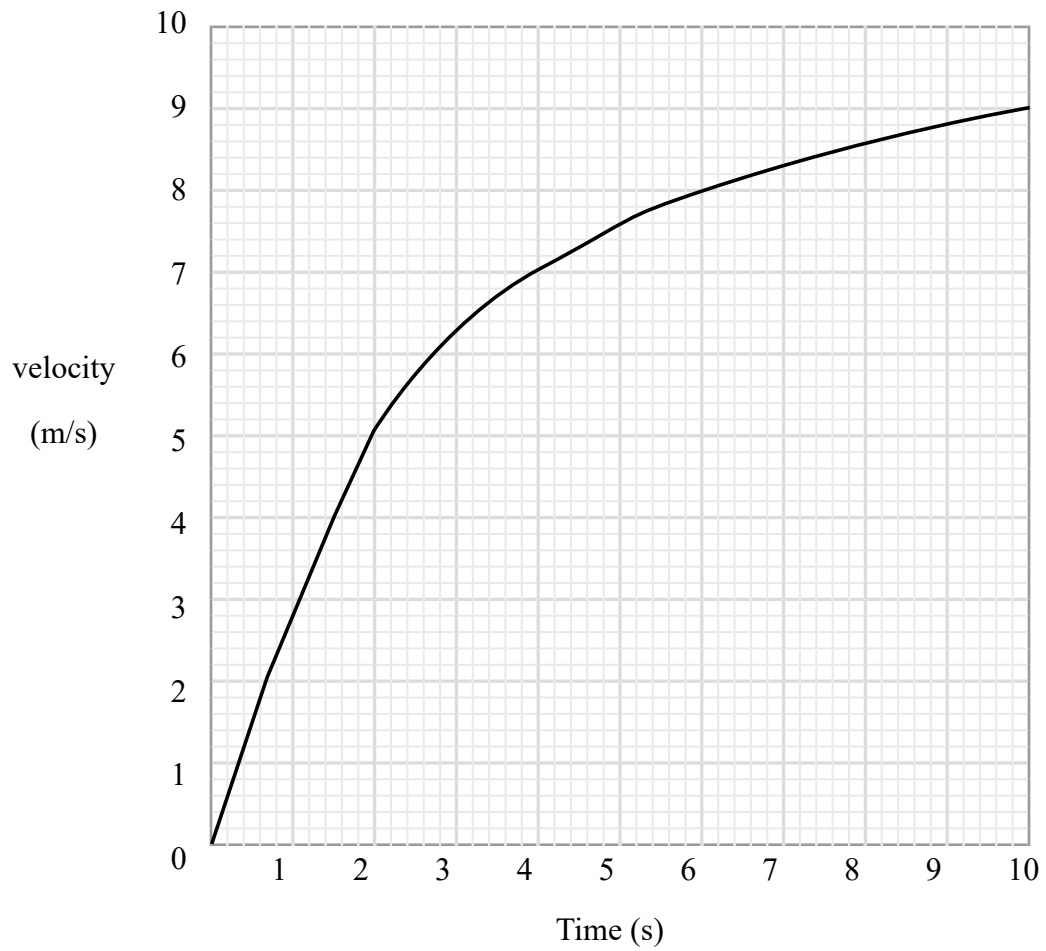
Find the ratio of the deposit Ronnie pays to the total of 12 equal payments.

Give your answer in its simplest form.

..... :

(Total for Question 19 is 5 marks)

20 The velocity-time graph shows information about the part of a bus journey.



(a) Work out the average acceleration of the bus for the first 4 seconds.

..... m/s^2

(3)

(b) Work out an estimate for the distance the bus travels in the first 8 seconds of its journey.
Use 4 strips of equal width.

.....m

(3)

(Total for Question 20 is 6 marks)

- 21 The figure below shows a circle with centre O , and radius 5 cm.
 A and B are two points such that AOB is an isosceles triangle.

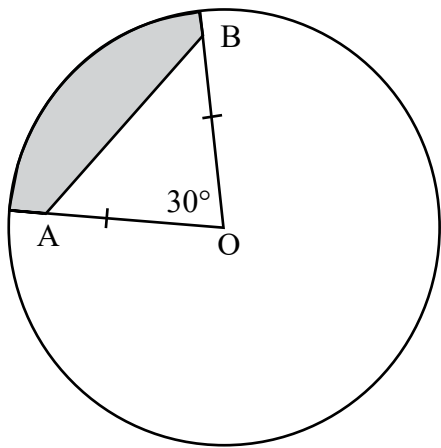


Figure not drawn to scale

$OA = OB$
 $OA = 4\text{ cm}$
 $\text{Angle } AOB = 30^\circ$

Find the area of the shaded region.
 Give your answer to 3 decimal places.

.....cm²

(Total for Question 21 is 5 marks)

22 Work out the value of y .

$$243^{\frac{2}{5}} \times 3^y = 27^{\frac{4}{3}}$$

.....

(Total for Question 22 is 3 marks)

23 (a) Construct a right angled triangle ABC with base $BC = 4$ cm, $AC = 5$ cm and angle $ABC = 90^\circ$.

(2)

(b) Construct another triangle PQR similar to triangle ABC with a scale factor of $\frac{3}{2}$.

(2)

(Total for Question 23 is 4 marks)

24 Solve $12 < \frac{n^2 - 8}{5} < 18$.

Show all your working.

$$\dots\dots\dots < n < \dots\dots\dots$$

(Total for Question 24 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS