Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pi Academy

Predicted Papers - Set 3

Morning (Time: 1 hour 30 minutes)

Mathematics

Paper 1 (Non-Calculator)
Higher Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.
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 not be used.**



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 ▶

PiAcademy™

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 In a bag there are apples, oranges and bananas.
A fruit is taken at random from the bag.
The table shows the probability of getting an apple.

Fruit	Apple	Orange	Banana
Probability	0.1		

The probability of getting an orange is half of the probability of getting a banana.

(a) Complete the table.

(2)

There are 15 oranges in the bag.

(b) Work out the total number of fruits in the bag.

.....

(2)

(Total for Question 1 is 4 marks)

2 (a) Work out $2\frac{3}{4} \div 1\frac{6}{10}$

Give your answer as a mixed number in its simplest form.

.....

(3)

(b) Find the lowest common multiple (LCM) of 28 and 35.

.....

(2)

(Total for Question 2 is 5 marks)

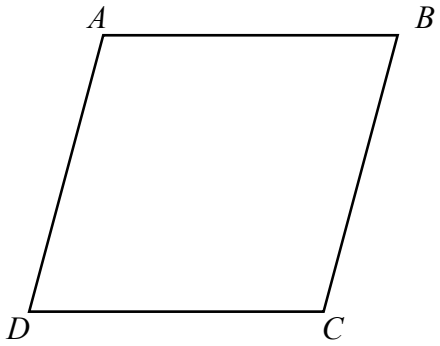
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3 If $f(x) = x^2 - 1$ and $g(x) = 4x$,then find $gf(x)$.

.....

(Total for Question 3 is 2 marks)

4



ABCD is a rhombus.

The coordinates of *A* are (6, 2)

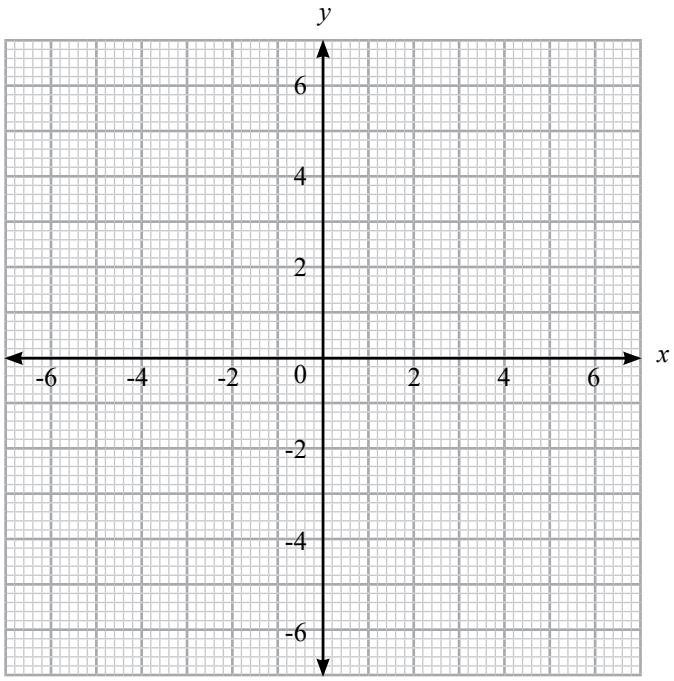
The equation of the diagonal *DB* is $4y - 3x = 12$

Find the gradient of the diagonal *AC*.

.....

(Total for Question 4 is 2 marks)

5 Plot the graph of $y = x^2 - 4x + 3$ for the values of x from 0 to 4, labelling the turning point and x-intercepts on the coordinate axis.



(Total for Question 5 is 4 marks)

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6 The population of a certain town is estimated to decrease by 10% every year.

(a) How much population will be left after 3 years if the initial population is 125000?

.....

(2)

(b) How many years will it take for the population to be less than three–fifths of the initial population?

.....

(2)

(Total for Question 6 is 4 marks)

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7 Adam has a box of chocolates.
Susie has a box of candies.
Jake has a box of cookies.

The number of candies is 10% more than the number of chocolates.
The number of cookies is 25% more than the number of chocolates.

Find the ratio of the number of cookies to the number of candies.

.....

(Total for Question 7 is 4 marks)

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8 (a) Work out the value of $121^{\frac{-3}{2}}$

.....

(2)

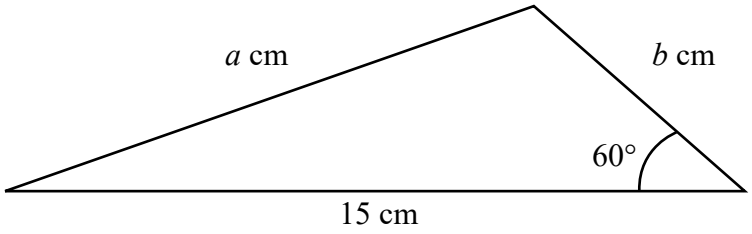
(b) Write down the value of $\left(\frac{1}{121}\right)^0$

.....

(1)

(Total for Question 8 is 3 marks)

9 The area of this triangle is $30\sqrt{3}$ cm^2



Work out the value of a.

.....cm

(Total for Question 9 is 4 marks)

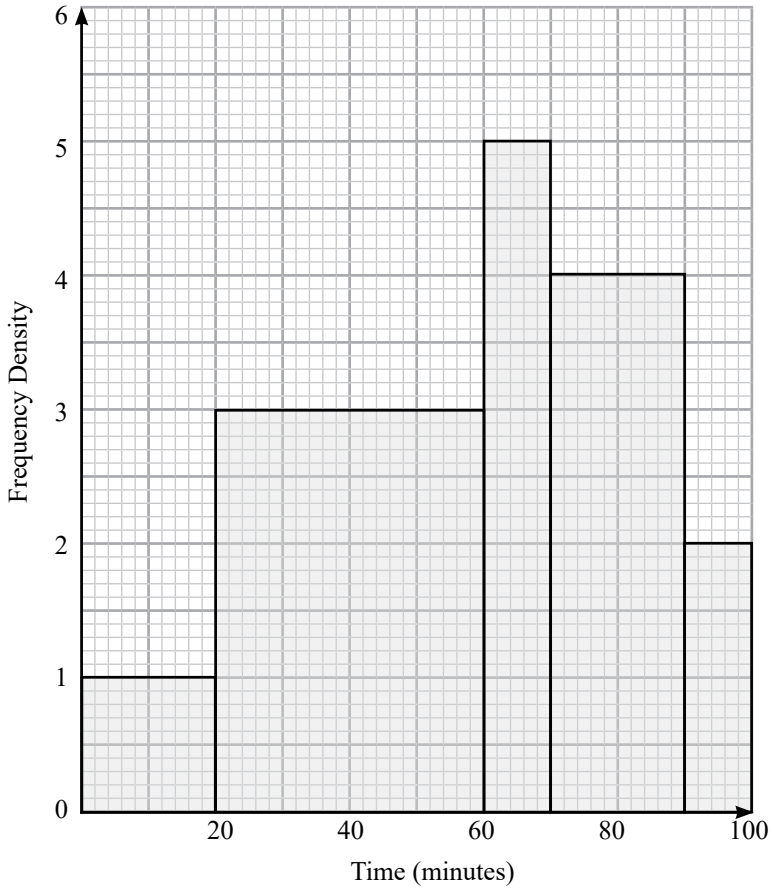
10 A straight line P passes through points $A(3, -2)$ and $B(0, 4)$.

Find an equation of the straight line that is perpendicular to P and passes through A.

.....

(Total for Question 10 is 3 marks)

11 The histogram shows the amount of time (in minutes) that 290 men spent exercising on one morning.



A large sample of women was asked about how much time they spent exercising on the same morning. The mean time for the women was 54 minutes.

Does the data show enough evidence to support the hypothesis that on average, men exercise for a longer time period than women?

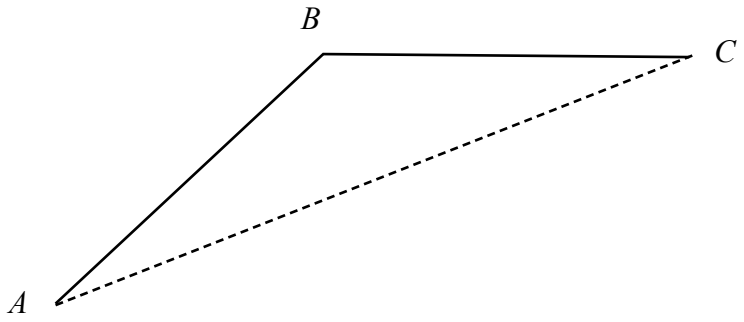
(Total for Question 11 is 4 marks)

12 In year 6 of a school, the ratio of boys to girls is 3:2. Also, there are 5 male teachers and 10 female teachers. The ratio of males to females in year 6 is 4:3 (including teachers). Find the number of females in Year 6.

.....

(Total for Question 12 is 3 marks)

13



AB and *BC* are 2 sides of a regular 15-sided polygon.

AC is a diagonal of the polygon.

Work out the size of angle *BAC*.

You must show your work.

..... °

(Total for Question 13 is 3 marks)

14 (a) Work out an estimate for the value of $\sqrt{\frac{24.22+66.09}{10.18}} + \frac{21.5^2}{\sqrt{96.1}}$

.....

(3)

(b) Jason used a calculator to find the value of $P = \sqrt{\frac{24.22+66.09}{10.18}}$

He wrote down the first 3 digits of the answer.

He wrote 2.97.

Write down the error interval for his answer.

…….. ≤ P <……..

(2)

(Total for Question 14 is 5 marks)

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15 Sum of the squares of two consecutive even numbers is 164.

Find the two numbers. You must show all your working.

.....

(Total for Question 15 is 3 marks)

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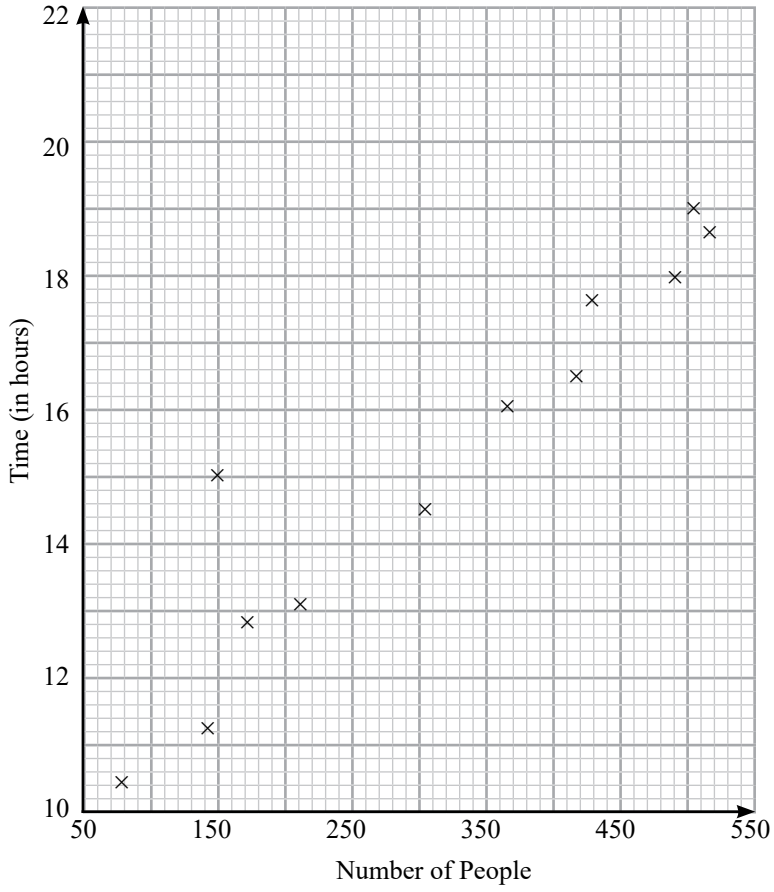
16 Write down all the integer values that satisfy the inequality $3x^2 - 48 \leq 0$.

.....

(Total for Question 16 is 3 marks)

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17 The scatter graph shows the the number of people present at a shopping mall at different hours on Friday.



One of the points is an outlier.

(a) Write down the coordinates of this point.

(....., ...)

(1)

(b) For all the other points, write down the type of correlation.

.....

(1)

(c) Use a line of best fit to estimate the number of people present in the shopping at 16:30.

.....

(2)

(d) The manager of the shopping mall decides to extend the closing hours of the mall on Fridays from 20:00 to 21:00.
Will the manager benefit from this decision? Give a reason for your answer.

.....

.....

.....

(2)

(Total for Question 17 is 6 marks)

18 Make n the subject of the formula $\frac{1}{2}(m-2)=\frac{1}{\sqrt{2}}\sqrt{n-1}$

.....

(Total for Question 18 is 3 marks)

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19 There is a 2-sided spinner and a 4-sided spinner.
The spinners are fair.
Mary is going to spin each spinner once.
Each spinner will land on a number.
Jessica will get her score by multiplying these two numbers together.

(a) Complete the possibility space diagram for each possible score.

		4 sided spinner			
		2	3	4	5
2 sided spinner	1	2			
	2	4			

(1)

Mary spins each spinner once.

(b) Find the probability that Mary gets,

(i) a score of 4.

.....

(1)

(ii) a score of 6 or more.

.....

(1)

(Total for Question 19 is 3 marks)

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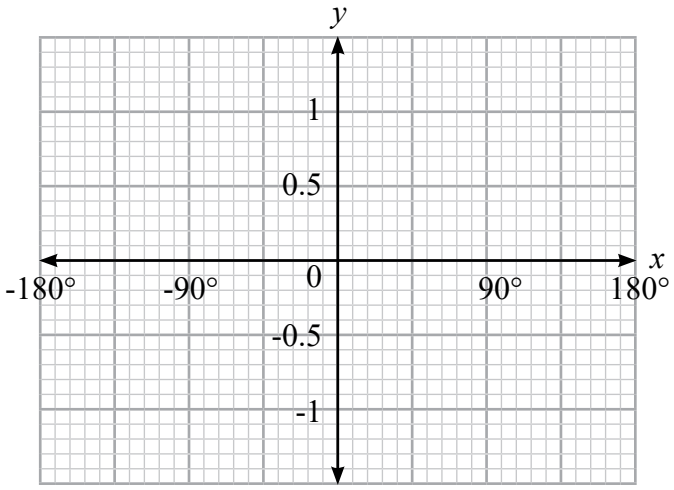
20 $\mathbf{a} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} 16 \\ 2 \end{pmatrix}$

Show that $\mathbf{a} + 2\mathbf{b}$ is parallel to $\mathbf{c}$.

(Total for Question 20 is 2 marks)

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21 (a) On the grid, sketch the graph of $y = \sin x°$ for $-180° \leq x \leq 180°$



(2)

(b) On the same grid, sketch the graph of $y = \sin(x - 45)°$ for $-135° \leq x \leq 135°$

(2)

(c) Give the coordinates of the point where $y = \sin(x - 45)°$ crosses the x-axis.

(..... , ...)

(1)

(Total for Question 21 is 5 marks)

22 A cylindrical pipe exerts a force of 462 N on the horizontal ground. The radius of the circular face resting on the ground is 7 m. Calculate the pressure exerted by the barrel on the ground.

..... N/m^2

(Total for Question 22 is 3 marks)

23 Find the next two terms in the following sequence

1 0.4 0.16 0.064

.....

(Total for Question 23 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS