

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

Pi Academy

Predicted Papers - Set 2

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 ►

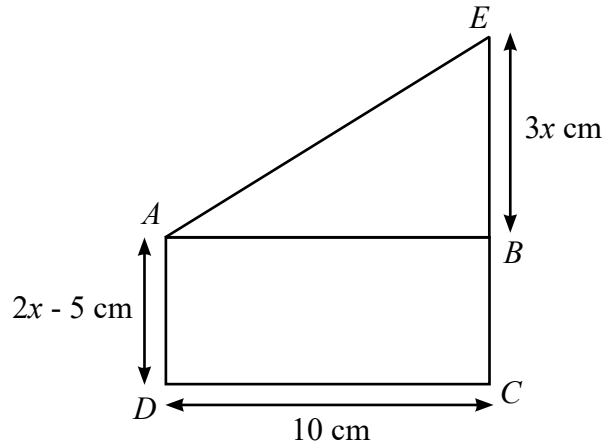


Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** The area of the figure shown below is 200 cm^2 .



Find the exact value of x , giving your answer in its simplest form.

.....

(Total for Question 1 is 3 marks)

2 Express 180 as the product of its prime factors.

.....

(Total for Question 2 is 2 marks)

3 Here are two similar solid shapes.



surface area of shape **A** : surface area of shape **B** = 25:4

The volume of shape **B** is 90 cm³

Work out the volume of shape **A**.

Give your answer correct to 4 significant figures.

..... cm³

(Total for Question 3 is 4 marks)

4 The equation of the line L_1 is $4x - 3y + 7 = 0$

The equation of the line L_2 is $3y - ax = 0$

If these two lines are perpendicular, then work out the value of a .

.....

(Total for Question 4 is 2 marks)

5 In London, 1 litre of gasoline costs 120.5p.

In California, 1 US gallon of gasoline costs \$3.00

1 US gallon = 3.785 litres

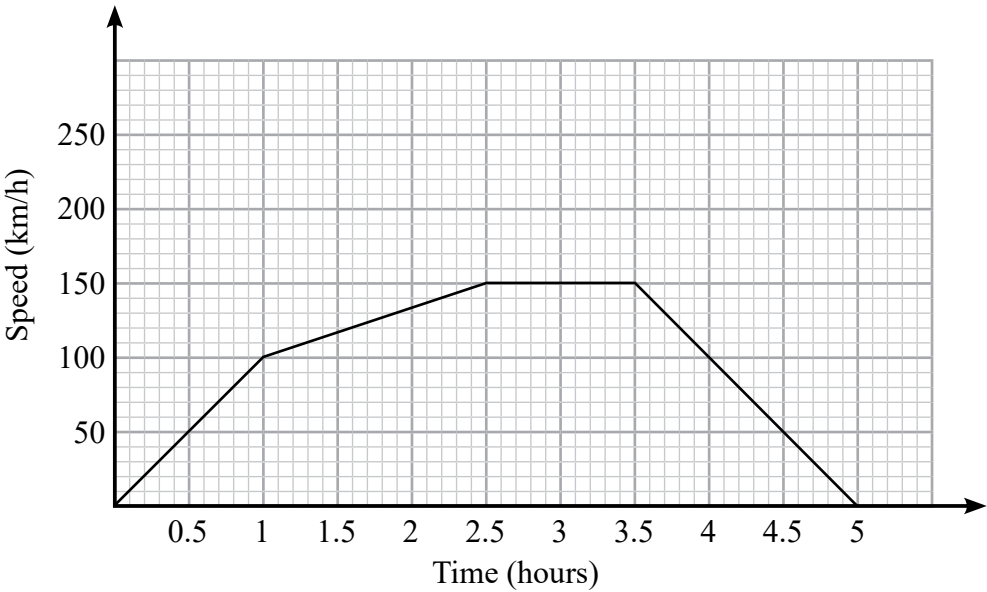
£1 = \$1.46

In which city is gasoline better value for money, London or California?

You must show your working.

(Total for Question 5 is 3 marks)

6 The following speed time graph shows the journey of a car for five hours.



(a) Work out the average acceleration of the car between 1 hour and 3.5 hours.

..... km/h²
(2)

(b) Find the total distance travelled by the car in 5 hours.

..... km
(3)

(Total for Question 6 is 5 marks)

7 A bakery makes 500 donuts every day.

The donuts are either Chocolate donuts or Vanilla.

Each day Mike takes a sample of 20 donuts to check.

The proportion of the donuts in his sample that are Chocolate is the same as the proportion of the donuts made that day that are Vanilla.

On Tuesday Mike calculated that he needed exactly 5 chocolate donuts in his sample.

Work out the total number of Chocolate Donuts that were made on Tuesday.

.....

(Total for Question 7 is 3 marks)

8 Solve the inequality $4x^2 \geq 64$.

$x \leq \dots\dots\dots$ (or) $x \geq \dots\dots\dots$

(Total for Question 8 is 2 marks)

9 Steven’s school has 800 pupils. Steven wants to find out how many of these pupils travel by school bus to go to school. He decides to ask 20 pupils of his class in the break time.

(a) Comment on whether Steven can use the results of his survey to draw conclusions about the 800 pupils.

.....

.....

.....

(2)

(b) Why might it not be a good idea to ask every pupil in the school?

.....

.....

.....

(1)

(Total for Question 9 is 3 marks)

10 The probability that a biased coin will land on heads is 0.4.

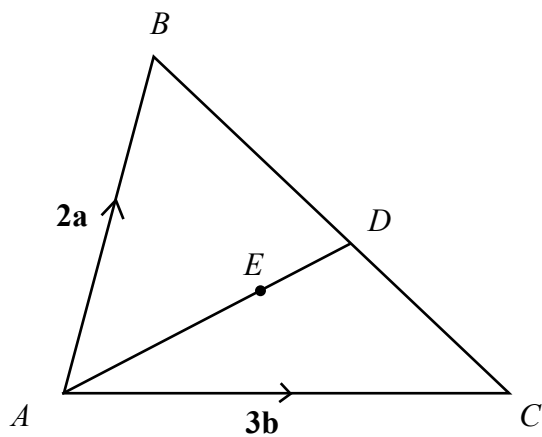
The coin is tossed 200 times.

Work out an estimate for the number of times the coin will land on tails.

.....

(Total for Question 10 is 2 marks)

- 11** The diagram shows a scalene triangle, ABC , with vectors $\overrightarrow{AB} = 2\mathbf{a}$ and $\overrightarrow{AC} = 3\mathbf{b}$. The point D is positioned on the line BC such that $BD : DC = 5 : 3$.
The point E is positioned on the line AD such that $AE : ED = 2 : 1$



Find an expression for $\overrightarrow{AE}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

.....

(Total for Question 11 is 3 marks)

12 f is a function such that $f(x) = \frac{2x+4}{5}$.

Show that $f^{-1}(4/3) = f(4/3)$

(Total for Question 12 is 4 marks)

13 (a) Write down the value of $81^{\frac{1}{2}}$

.....

(1)

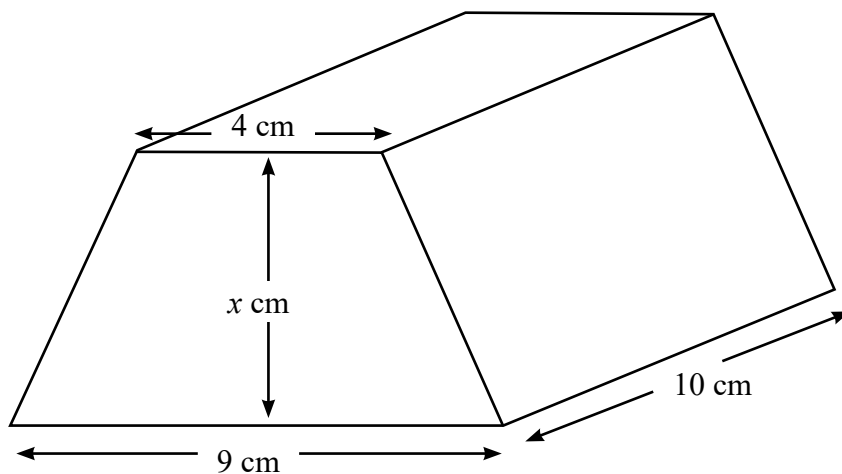
(b) Work out the value of $125^{\frac{2}{3}}$

.....

(2)

(Total for Question 13 is 3 marks)

14



The diagram shows a prism.

The cross-section of the prism is a trapezium.

The volume of the prism is 260 cm^3

Work out the value of x .

.....

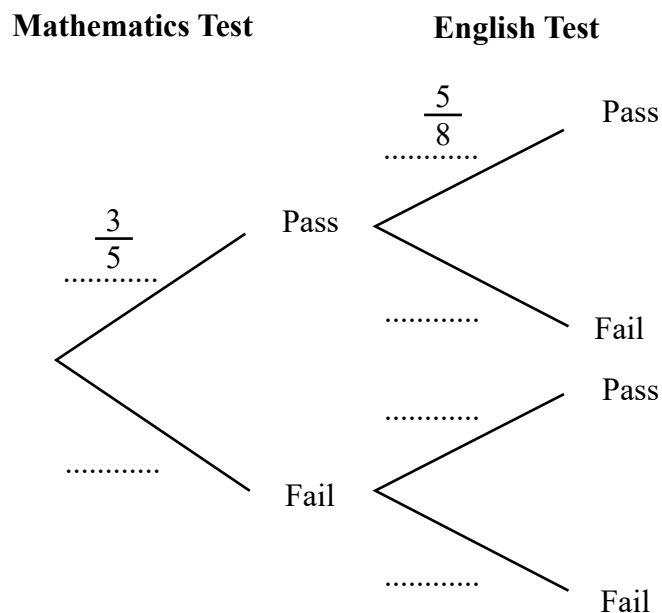
(Total for Question 14 is 2 marks)

15 Jack is going to write one mathematics test and one English.

The probability he will pass the mathematics test is $\frac{3}{5}$

The probability he will pass the english test is $\frac{5}{8}$

(a) Complete the probability tree diagram



(2)

(b) Work out the probability that Jack will fail both tests.

(2)

(Total for Question 15 is 4 marks)

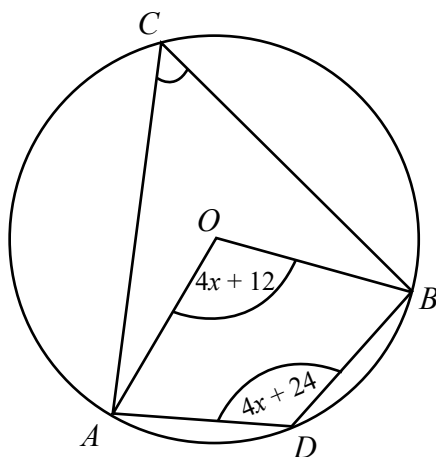
16 Points A , B and C are all on the circumference of the circle.

O represents the centre.

Angle $AOB = 4x + 12$

Angle $ADB = 4x + 24$

Calculate the value for x .

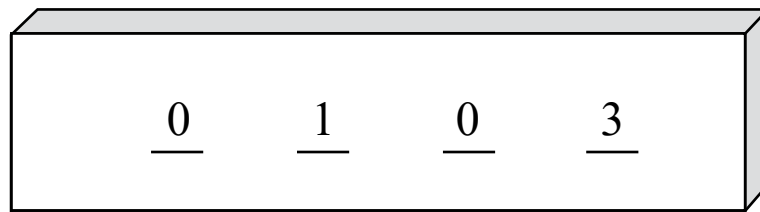


.....
(Total for Question 16 is 4 marks)

17 Four numbers are required to make a number plate.

Each place can be set to one of the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

The four digit number 0103 is one way to make a number plate as shown below.



(a) Work out the number of four digit numbers that can be set to make a number plate.

.....

(2)

(b) How many of the possible four digit number plates have all the four digits different?

.....

(2)

(Total for Question 17 is 4 marks)

- 18 The grouped frequency table gives information about the times, in minutes, that 80 students take to get to school.

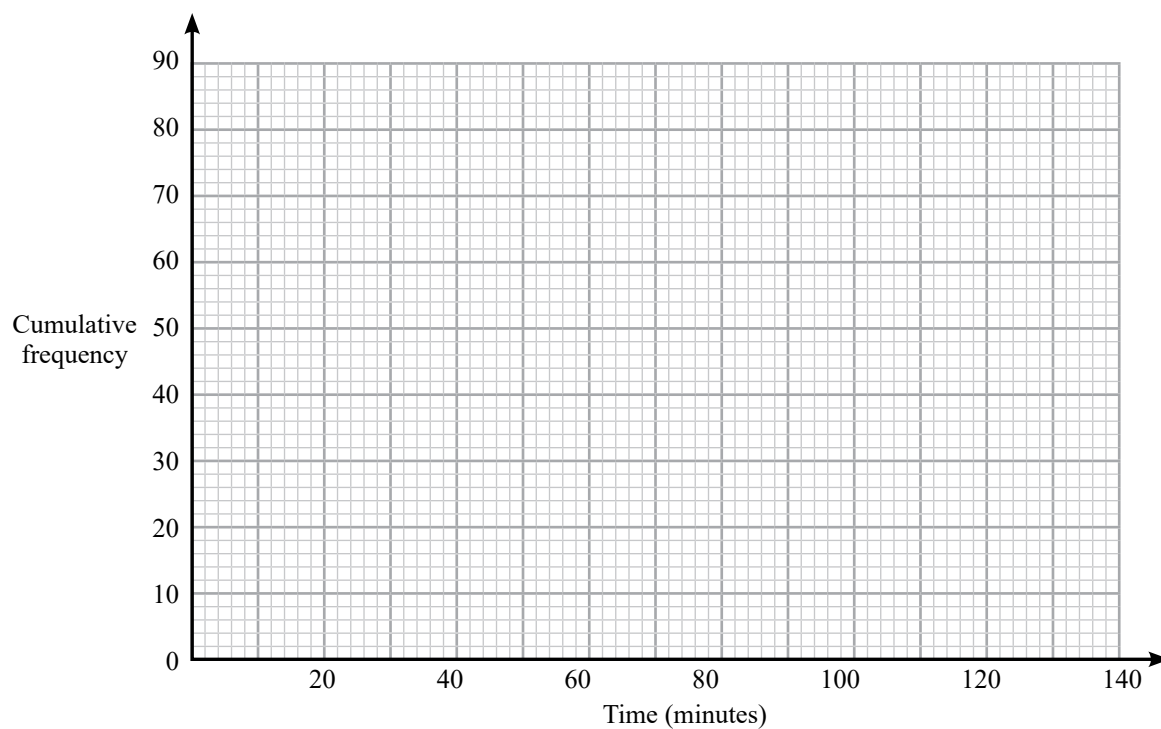
Time(t minutes)	Frequency
$0 < t \leq 20$	18
$20 < t \leq 40$	21
$40 < t \leq 60$	17
$60 < t \leq 80$	10
$80 < t \leq 100$	8
$100 < t \leq 120$	6

- (a) Complete the cumulative frequency table.

Time(t minutes)	Cumulative Frequency
$0 < t \leq 20$	
$0 < t \leq 40$	
$0 < t \leq 60$	
$0 < t \leq 80$	
$0 < t \leq 100$	
$0 < t \leq 120$	

(1)

(b) On the grid, draw the cumulative frequency graph for this information.



(2)

(c) Use your graph to find an estimate for the median number of minutes to get to school.

.....minutes

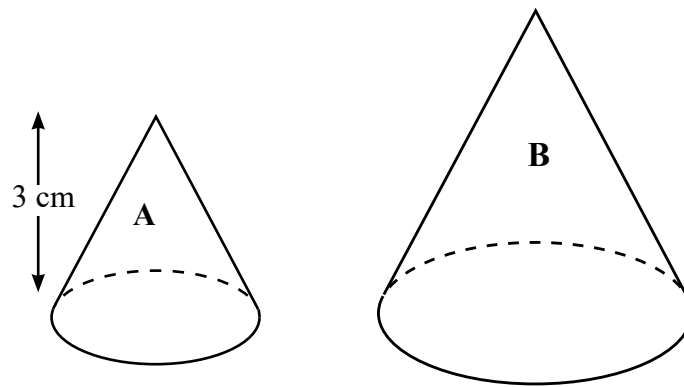
(1)

(d) Use your graph to find an estimate for the number of students who spent less than 70 minutes to get to the school.

.....

(1)

(Total for Question 18 is 5 marks)



Two cones, **A** and **B**, are mathematically similar.

The total surface area of cone **A** is 36 cm^2 .

The total surface area of cone **B** is 81 cm^2 .

The height of cone **A** is 3 cm.

(a) Work out the height of cone **B**.

.....cm

(2)

The volume of cone **A** is 12 cm^3

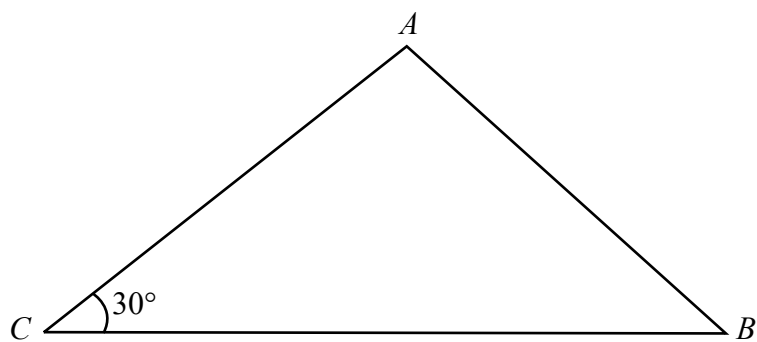
(b) Work out the volume of cone **B**.

..... cm^3

(3)

(Total for Question 19 is 5 marks)

20



The ratio of the length of BC to the length of AC is 3:2

The area of the triangle is 216 cm^2

Work out the length of side BC .

..... cm

(Total for Question 20 is 3 marks)

21 Sam performs an experiment to find the density of an object.

He measures the mass of the object as 12.25 kg and the volume of the object as 3.67 m^3 .

(a) Estimate the density of the object.

..... kg/m^3

(3)

After more measurements Sam finds the volume of the object as 4.3 m^3 .

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

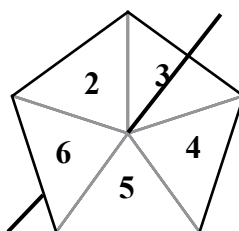
.....

.....

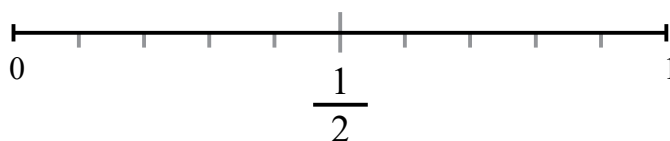
(1)

(Total for Question 21 is 4 marks)

22 Japsimer spins a fair 5 sided spinner.



(a) On a probability scale mark with a cross(×) the probability that the spinner lands on multiple of 2.



(1)

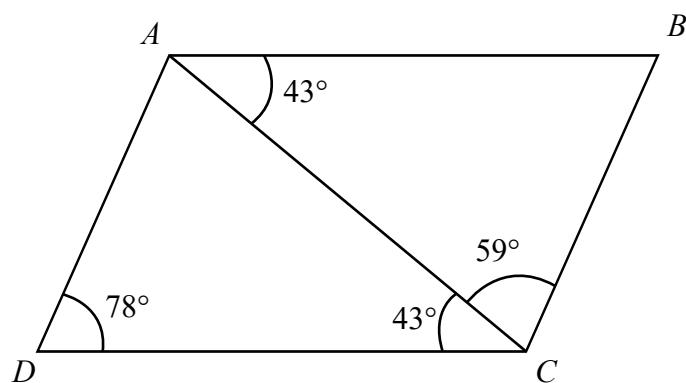
(b) Write down the probability that the spinner lands on a square number.

.....

(1)

(Total for Question 22 is 2 marks)

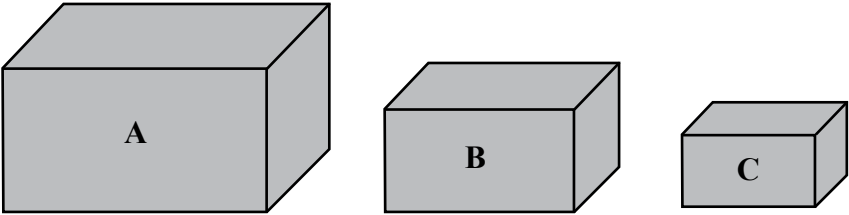
23 The diagram shows two triangles, ABC and CDA .



Prove that triangle ABC is congruent to triangle CDA .

(Total for Question 23 is 2 marks)

24 Here are three boxes.



The volume of box **A** is 25% more than the volume of box **B**.
The volume of box **B** is 25% more than the volume of box **C**.
Find the volume of box **A** as a fraction of the volume of box **C**.

.....

(Total for Question 24 is 3 marks)

25 (a) Find an expression for n th term of the following sequence

20 28 36 44

.....

(2)

(b) Is 484 a term in this sequence?

.....

(1)

(Total for Question 25 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS