Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				

Examiner Comments

Total Marks

PAPER 3H

GCSE MATHEMATICS

CM

Practice Set B   Calculator   Time allowed: 1 hour 30 minutes

Instructions to candidates:

- In the boxes above, write your centre number, candidate number, your surname, other names and signature.
- Answer ALL of the questions.
- You must write your answer for each question in the spaces provided.
- You may use a calculator.

Information to candidates:

- Full marks may only be obtained for answers to ALL of the questions.
- The marks for individual questions and parts of the questions are shown in round brackets.
- There are 16 questions in this question paper. The total mark for this paper is 80.

Advice to candidates:

- You should ensure your answers to parts of the question are clearly labelled.
- You should show sufficient working to make your workings clear to the Examiner.
- Answers without working may not gain full credit.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

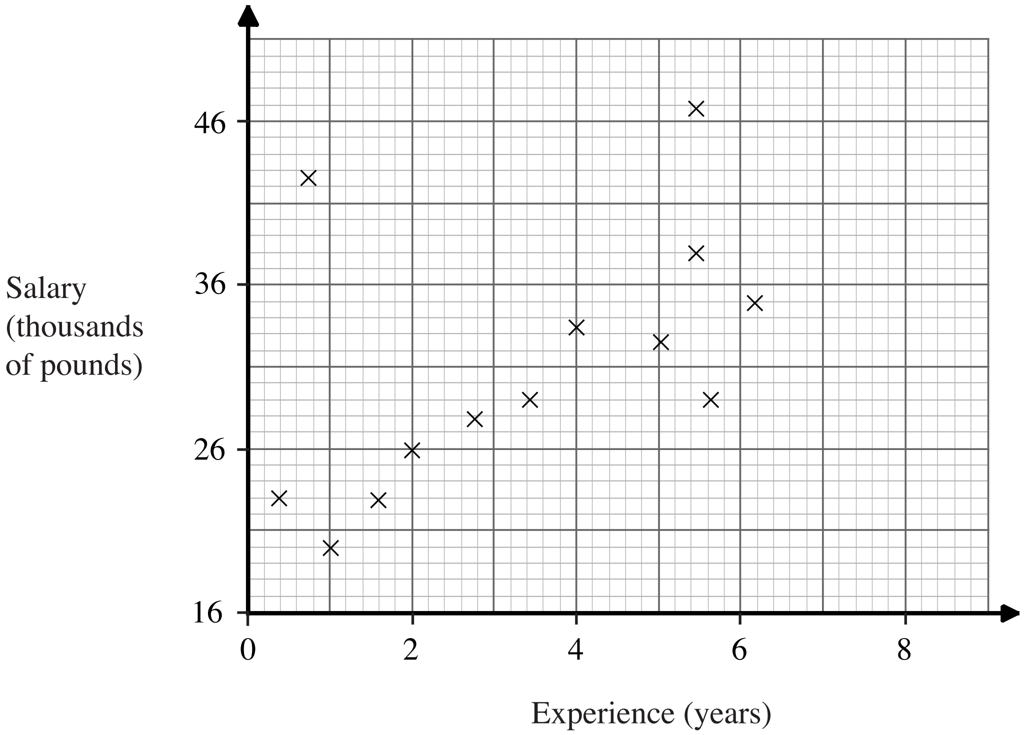
1 Express 288 as a product of its prime factors.

....

(Total for Question 1 is 3 marks)

2 Data is collected about the salaries of individuals and their years of experience.

The data is shown in the scatter graph below.



(a) Describe the relationship shown between an individual's salary and their experience.

....

....

(1)

(b) Estimate the salary of an individual with 8 years of experience.

£....................................

(2)

(c) Explain why your answer to part (b) is unreliable.

....

....

(1)

(Total for Question 2 is 4 marks)

3 Line **A** has equation $y = 4 - 3x$.

Line **B** has equation $6x + 2y = 7$.

(a) Show that line **A** and line **B** are parallel.

(2)

The line **C** has the equation $7x - y = k(4 - x)$

Given that line **C** is parallel to line **A**,

(b) find the value of k.

....

(3)

(c) Find the y intercept of the line **C**.

....

(2)

(Total for Question 3 is 7 marks)

4 x is an integer where $-3 \leq x < 3$.

(a) Write down all the possible values of x.

....

(1)

(b) Find the largest possible value of $(2x)^2$.

....

(2)

(c) Find the largest possible value of $1 - x^{-1}$.

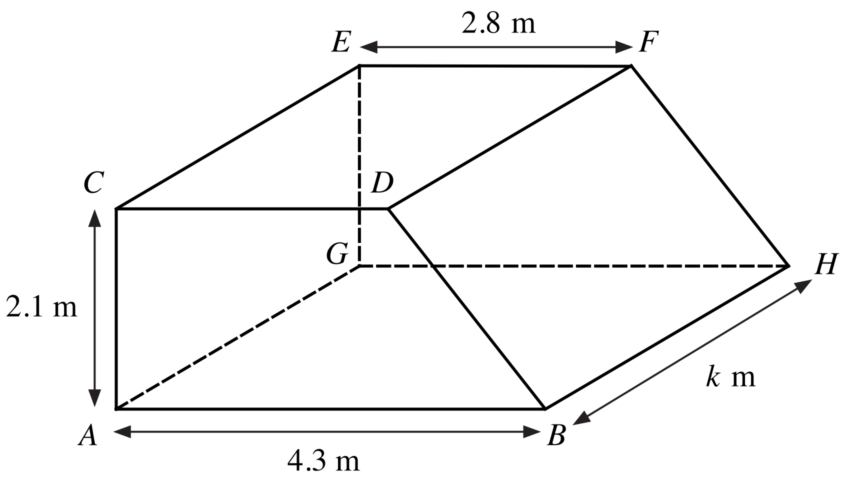
....

(2)

(Total for Question 4 is 5 marks)

Do not write outside the box

5



NOT TO SCALE

ABCDEFGH is a tank.

The tank is a prism and the cross-section of the prism is a trapezium.

The tank has been filled completely with water and sand.

The ratio of water to sand in the tank is 2:3.

There is 23.9 m^3 of water in the tank.

Find the value of k.

Give your answer to three significant figures **and** show all of your working.

....

(Total for Question 5 is 6 marks)

6 Mark wants to fill his car with L litres of petrol.

There are two petrol stations near Mark.

The price of fuel at station **A** is 124.2 pence per litre.
The price of fuel at station **B** is 112.7 pence per litre.

Station **B** is 3.1 miles further away from Mark than station **A**.

When Mark travels at 30 mph in his car, his fuel consumption is 37.2 miles per gallon.

1 mile per gallon is about 0.22 miles per litre.

(a) Find the largest value of L for which it is cheaper for Mark to use station **A** to fill his car.
You must show all of your working.

....

(5)

(b) State **one** assumption you have made.

....

....

(1)

(Total for Question 6 is 6 marks)

7 Chantelle investigates the lengths of her colleagues' journeys to work.

The data she collected is summarised below.

Journey length (L minutes)	Frequency
$0 < L \leq 20$	12
$20 < L \leq 40$	x
$40 < L \leq 90$	28
$L > 90$	0

An estimate for the mean of Chantelle's data is $\frac{478}{11}$ minutes.

Find x.

....

(Total for Question 7 is 4 marks)

8 Air traffic controllers monitor nearby airplane activity in the sky.

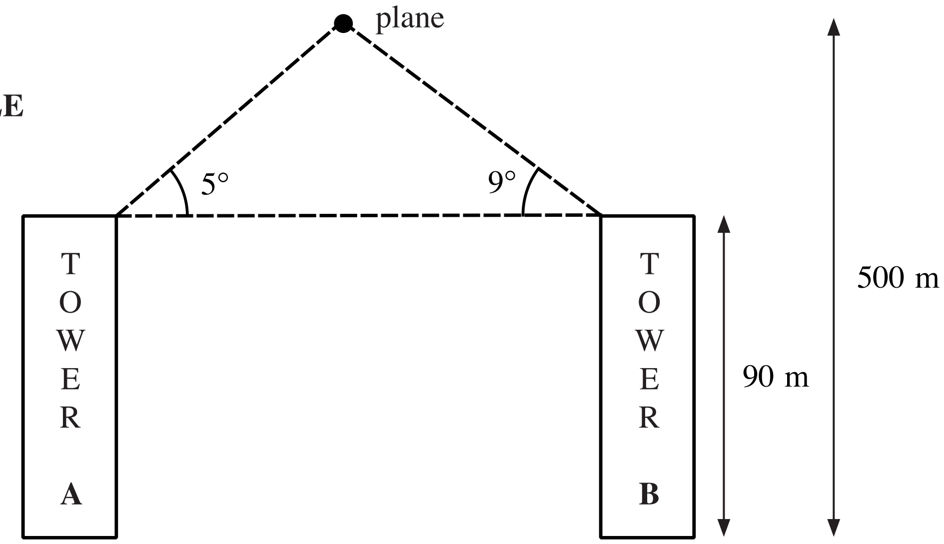
Two air traffic control towers are 90 m above the ground.

They both detect the same plane on their radar.

The plane is 500 m above the ground.

The angle between Tower **A** and the plane is 5°.
The angle between Tower **B** and the plane is 9°.

NOT TO SCALE



Find the distance between the two control towers.

....m

(Total for Question 8 is 4 marks)

Do not write outside the box

9 A rectangle has width $(2x - 1)$ cm and height $(x + 3)$ cm.

The perimeter of the rectangle is 34 cm.

(a) Find the value of x.

....

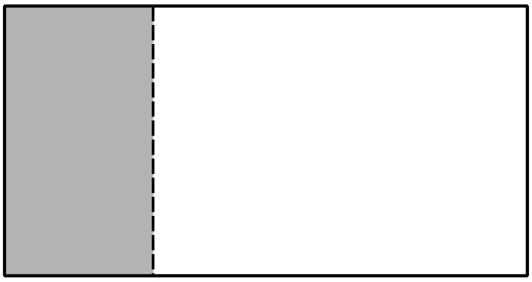
(3)

Jawad draws the rectangle from part (a) on a computer software.

He then adds a vertical line from edge of the rectangle to the other.

He shades the region to the left of his line, as shown in the diagram below.

The computer then chooses one of the two regions at random.



The area of the shaded region is 27 cm^2.

The probability of the computer region selecting one of the regions is proportional to its area.

(b) Find the probability that the computer region does **not** pick the shaded region.

....

(2)

(Total for Question 9 is 5 marks)

10 Three pipes are connected to a tank with volume V.

Liquid flows into the tank through pipe **A** and pipe **B** at a constant rate.
Liquid flows out of the tank through pipe **C** at a constant rate.

Pipe **A** can completely fill the entire tank in 20 minutes.
Pipe **B** can fill three quarters of the tank in 20 minutes.
Pipe **C** can completely empty the tank when it is full in 40 minutes.

The tank is emptied and all three pipes are switched on.

Calculate the time taken, in minutes, for the tank to be completely filled with water.

.... minutes

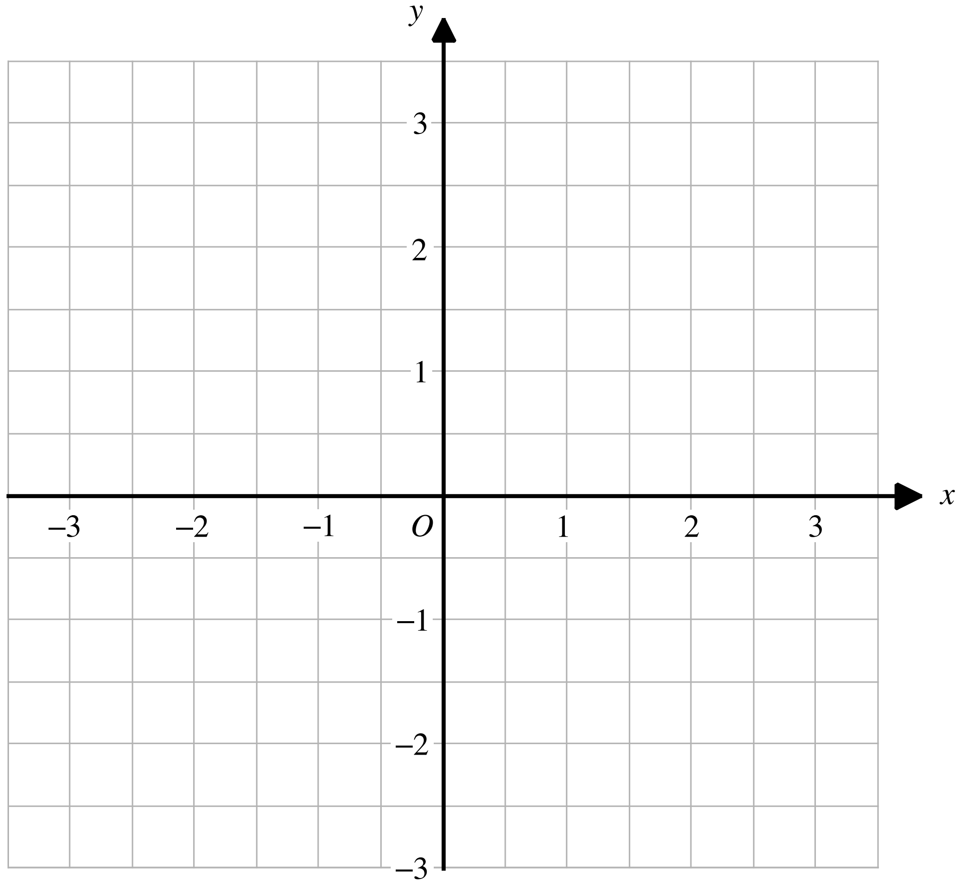
(Total for Question 10 is 4 marks)

Do not write outside the box

11 On the grid, shade the region that satisfies all these inequalities,

$$x + 3 > 0 \qquad y > x \qquad y < 2 - x$$

Label the region **R**.



(Total for Question 11 is 3 marks)

12 Solve the equation $\frac{3x+2}{2} = \frac{x-3}{4} + \frac{1}{x}$.

Give your answers to two decimal places.

....

(Total for Question 12 is 5 marks)

Do not write outside the box

13 (a) Simplify $\frac{5x^2 - 125}{2x^2 + 13x + 15}$.

....

(3)

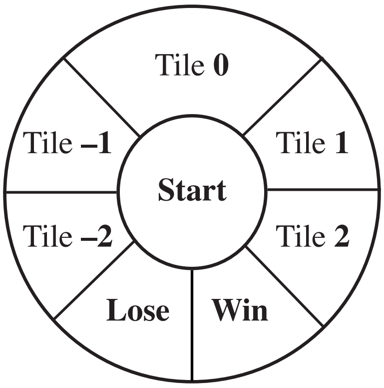
(b) Make a the subject of the formula $b = \frac{1}{\sqrt{1 + a^2}}$.

....

(3)

(Total for Question 13 is 6 marks)

14 Alice has designed a single player game.



The game is played with a counter and a fair six-sided die.

The player places their counter on the inner circle of the board on the **Start** tile.

To move the counter to Tile **0**, the player must roll a 6.

Players then move their counter one tile clockwise if they roll a 1 or a 5.
If they roll a 2, 3, 4 or a 6, they move their counter one tile anticlockwise.

Alice plays the game and puts her counter on the **Start** tile.

She rolls the die twice.

(a) Find the probability that her counter is on Tile **1**.

....

(2)

(b) Find the probability that Alice's counter does not leave the **Start** tile.

....

(1)

A player can win or lose the game.

The game is won if the counter reaches the Win tile.
The game is lost if the counter reaches the Lose tile.

Alice moves her counter back to the Start tile and rolls the die four times.

(c) Find the probability that Alice wins.

....

(2)

Let x be the probability that Alice loses.
Let y be the probability that Alice's counter is on Tile 1 after her four rolls.

(d) Show that $\frac{x}{y} = \frac{32}{41}$.

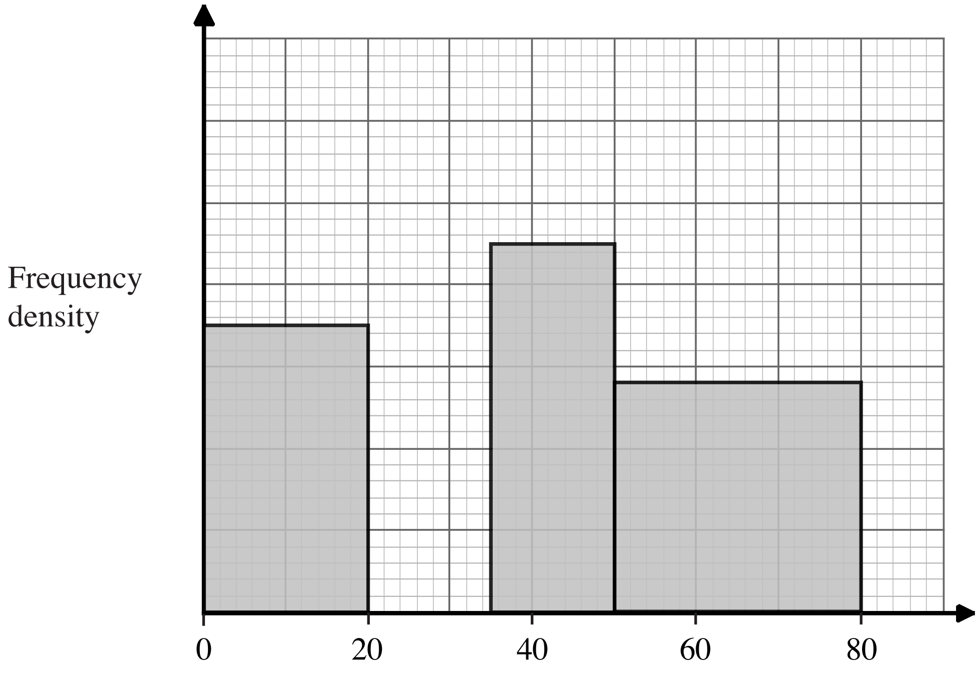
....

(3)

(Total for Question 14 is 8 marks)

15 Data is collected about the age of people that live in a village.

The incomplete table and histogram below give information on the data collected.



(a) Use the information in the histogram to complete the frequency table below.

Age (a years)	Frequency
$0 < a \leq 20$	140
$20 < a \leq 25$	75
$25 < a \leq 35$	170
$35 < a \leq 50$	
$50 < a \leq 80$	

(2)

(b) Complete the histogram. **(2)**

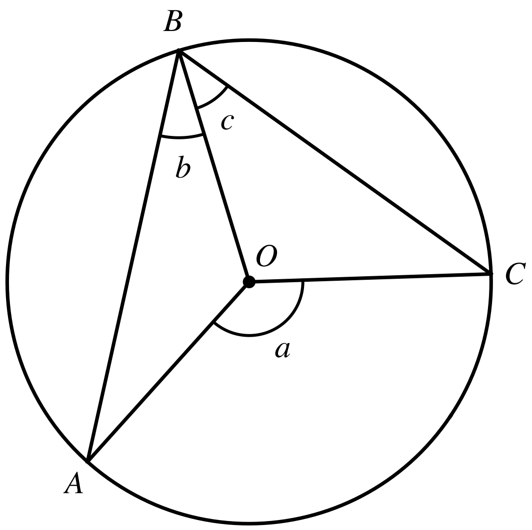
(c) Estimate the number of individuals in the village aged between 25 and 38 years old.

....

(3)

(Total for Question 15 is 6 marks)

16



The points A, B and C are points on a circle with centre O.

The angle AOC is a.
The angle OBA is b.
The angle OBC is c.

(a) Prove that $a = 2(b + c)$.

(3)

(b) Give a condition for the triangles OAB and OBC to be similar.

....

....

(1)

(Total for Question 16 is 4 marks)

TOTAL FOR PAPER = 80 MARKS