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9 A rainwater tank contains 2.4×10^7 raindrops.
The rainwater tank also contains 1.75×10^6 bacteria.

- (a) Work out the number of bacteria per raindrop in the tank.
Give your answer in standard form correct to 2 significant figures.

.....
(3)

A drop of rainwater contains 5.01×10^{21} atoms.

In a drop of rainwater the number of atoms is 3 times the number of molecules.

- (b) Work out the number of molecules in the rainwater tank.
Give your answer in standard form correct to one significant figure.

..... molecules
(2)

(Total for Question 9 is 5 marks)



10 ABC is an isosceles triangle with $BA = BC$.

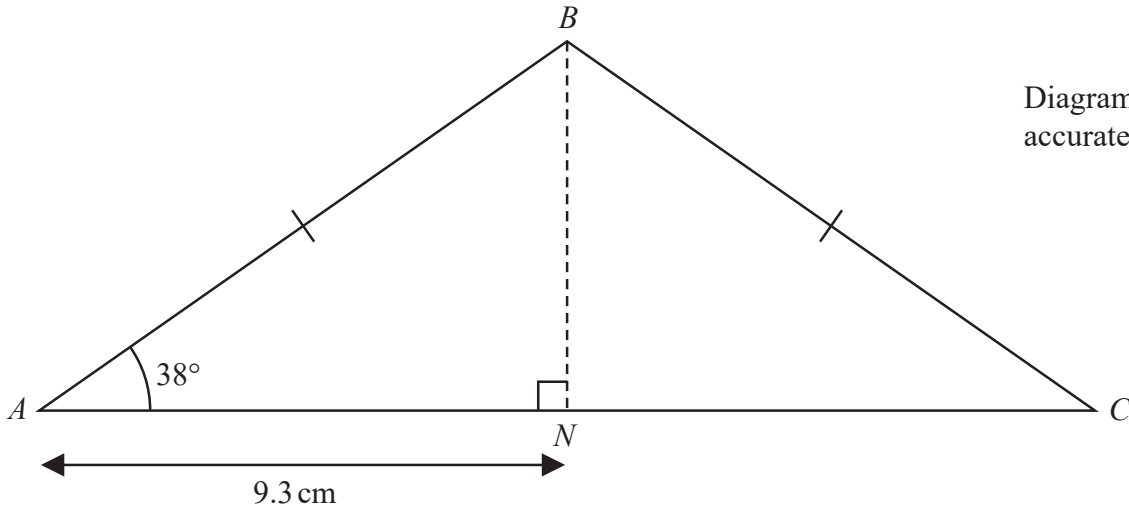


Diagram NOT accurately drawn

N is the point on AC such that $AN = 9.3$ cm and BN is perpendicular to AC .

Work out the perimeter of triangle ABC .
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 10 is 4 marks)

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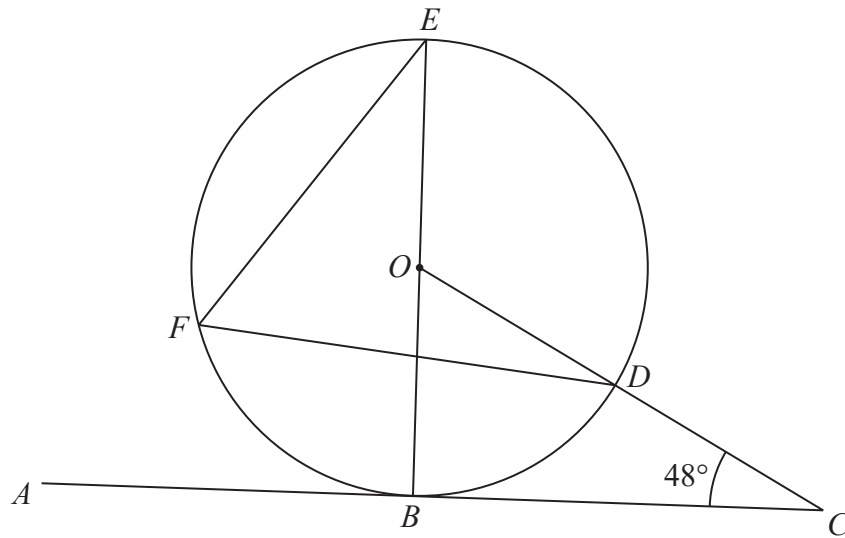


Diagram NOT accurately drawn

B, D, E and F are points on a circle, centre O .
 ABC is a tangent to the circle.
 ODC is a straight line.

BOE is a diameter of the circle.

Angle $BCD = 48^\circ$

Find the size of angle DFE .

.....
(Total for Question 11 is 3 marks)



12 (a) Simplify $(64p^9q^{12})^{\frac{2}{3}}$

.....
(2)

(b) Write as a single fraction $\frac{2}{3x} + \frac{4}{5x} - \frac{9}{10x}$

Give your answer in its simplest form.

.....
(2)

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(c) Expand and simplify $4x(x - 5)(2x + 3)$
Show your working clearly.

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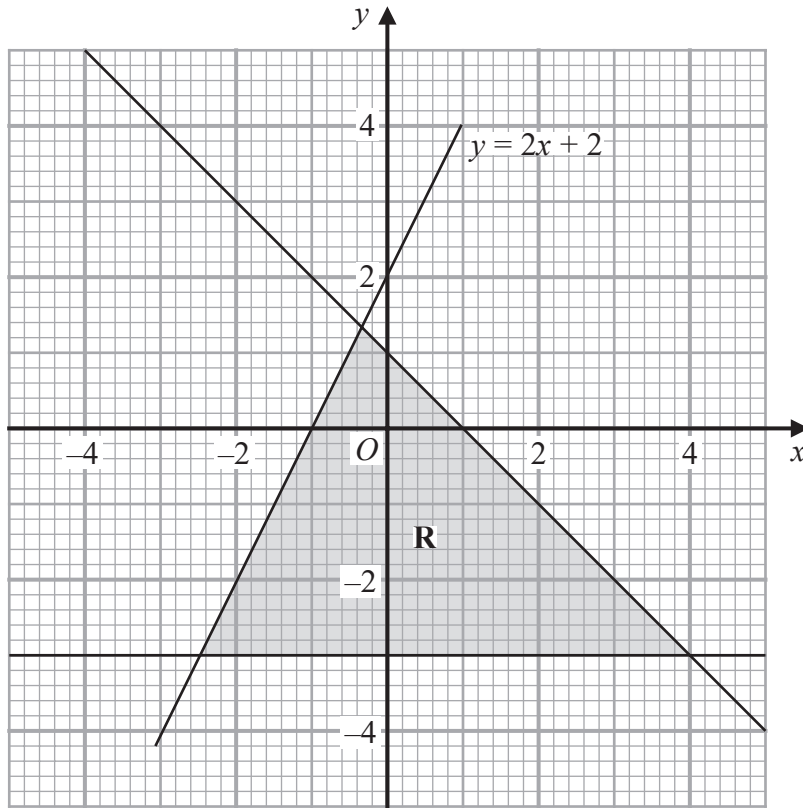
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.....
(3)

(Total for Question 12 is 7 marks)





The region **R**, shown shaded in the diagram, is bounded by three straight lines.
Write down the three inequalities that define **R**.

.....

(Total for Question 13 is 3 marks)

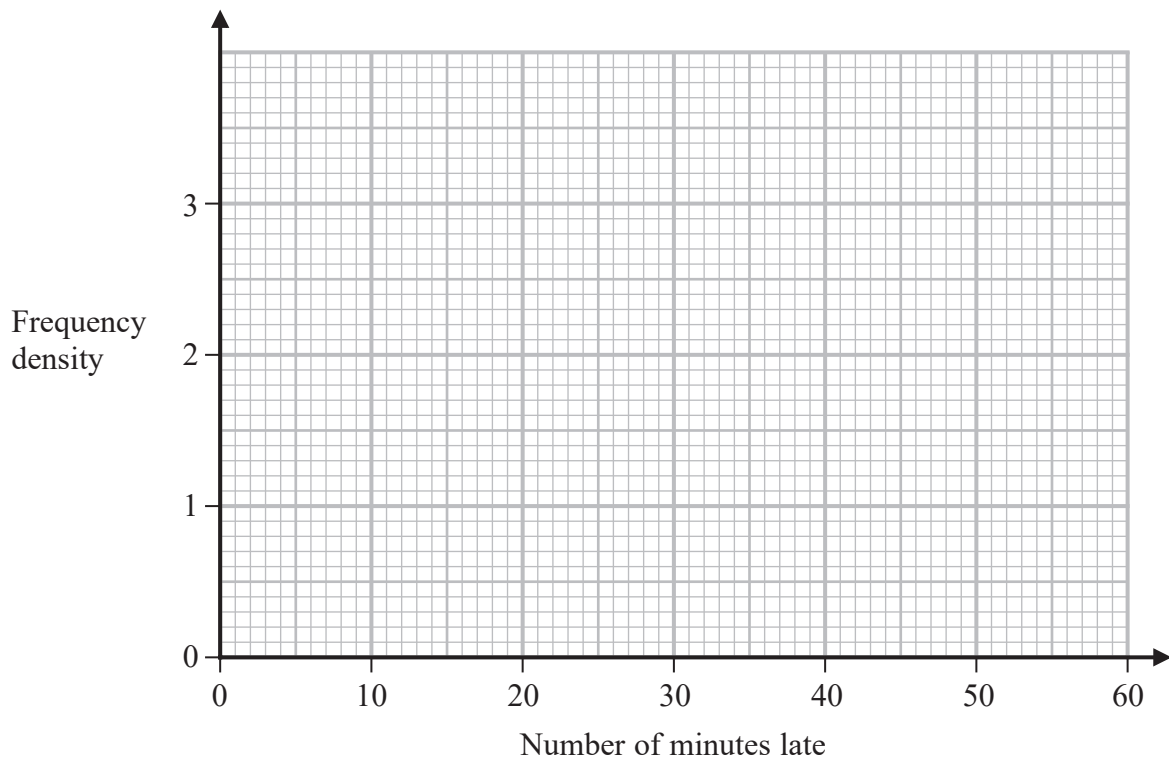


14 Manuel collected information about the flights that arrived late at an airport last month.

The table gives information about the number of minutes that these flights were late.

Minutes late (L minutes)	Frequency
$0 < L \leq 10$	8
$10 < L \leq 15$	13
$15 < L \leq 25$	19
$25 < L \leq 40$	24
$40 < L \leq 60$	6

(a) On the grid, draw a histogram for this information.



(3)

Manuel selected at random a flight that was late by 25 minutes or less from his results.

(b) Work out an estimate for the probability that this flight was late by 5 minutes or less.

(2)

(Total for Question 14 is 5 marks)



15 The functions f and g are such that

$$f(x) = 2x - 3$$

$$g(x) = \frac{x}{3x + 1}$$

(a) State the value of x that cannot be included in any domain of g

.....
(1)

(b) Find $gf(x)$
Simplify your answer.

$gf(x) =$

(2)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x) = \dots$

$g^{-1}(x) =$

(3)

(Total for Question 15 is 6 marks)

