

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Algebra

Using and finding equations of linear real-life graphs

v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments

Information

- The marks for questions are shown in brackets

Advice

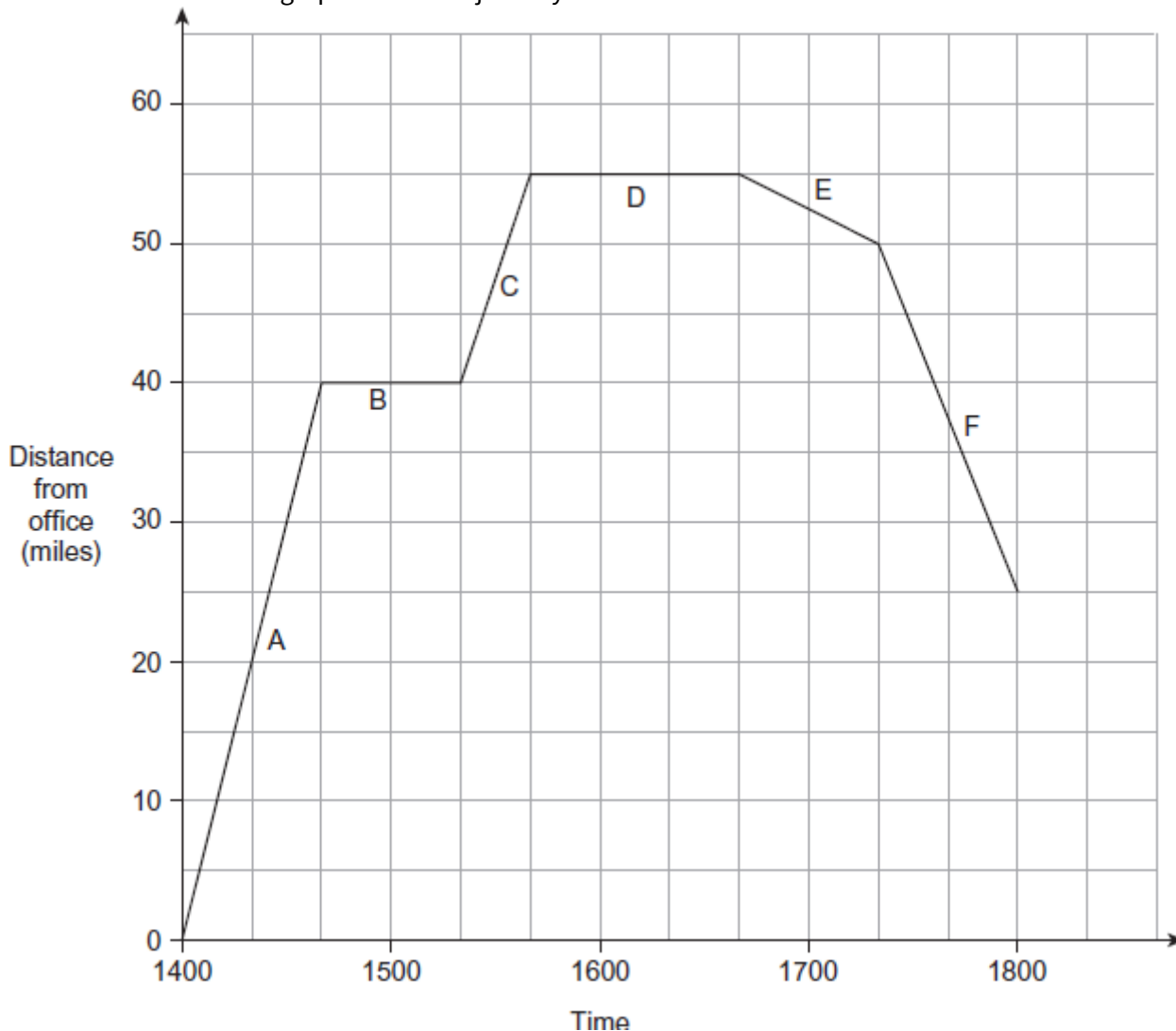
- In all calculations, show clearly how you work out your answer

For questions 1 to 7 you must **NOT** use a calculator.



Q1.

Ruth left her office at 1400
She drove to two meetings and then drove home.
The distance-time graph shows her journeys.



- (a) How many minutes was she stopped altogether?

Answer _____ minutes

(1)

- (b) How many miles did she drive altogether?

Answer _____ miles

(1)

- (c) On which part of the journey was her speed the fastest?

Circle your answer.

A

C

E

F

(1)

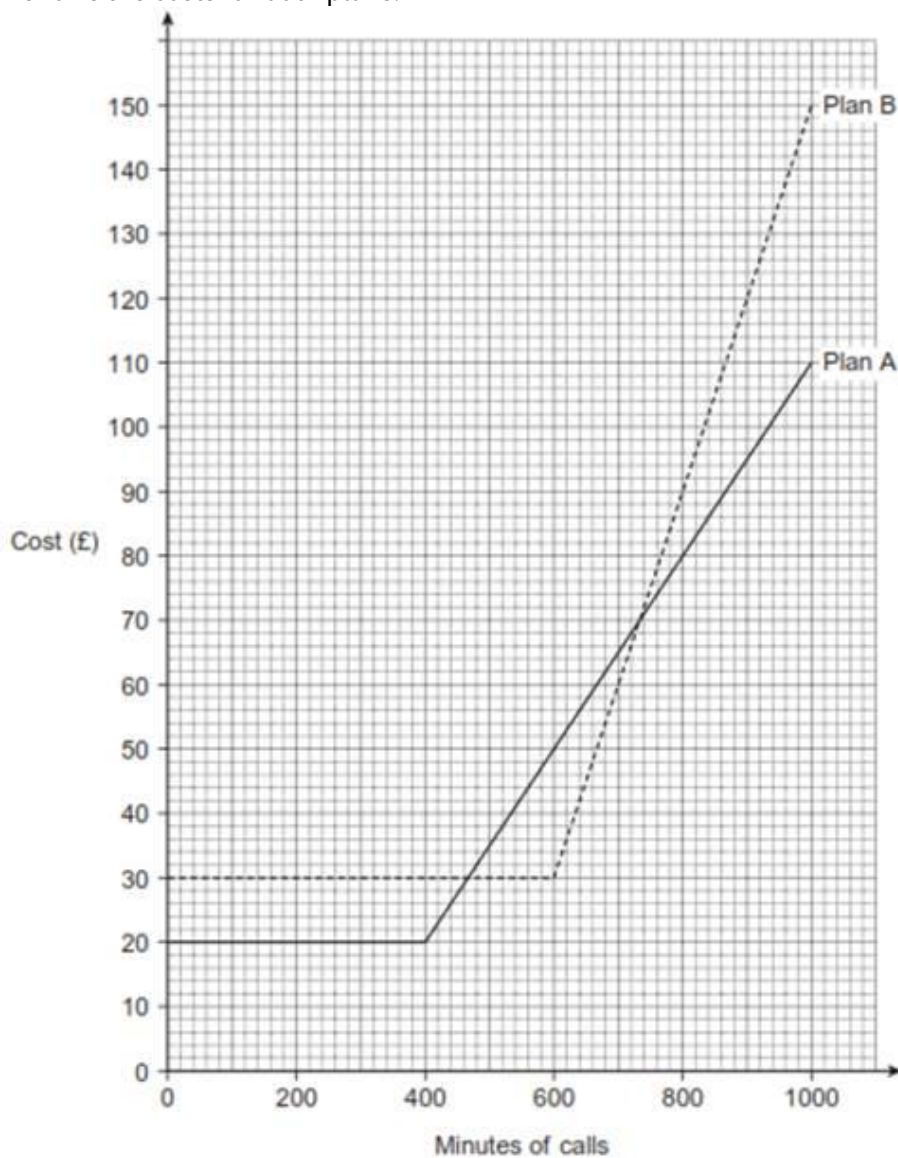
(Total 3 marks)

Q2.

Plan A and Plan B are two monthly mobile phone plans.
Here are the details of Plan A.

Monthly charge	£20
400 minutes of calls	Free
Each extra minute	15p

The graph shows the costs for both plans.



- (a) Ben usually makes about 800 minutes of calls a month.
Which plan should he choose?
Give a reason for his choice.

(2)

- (b) Sarah chooses Plan B.
How much does she pay for each extra minute of calls?

Answer _____

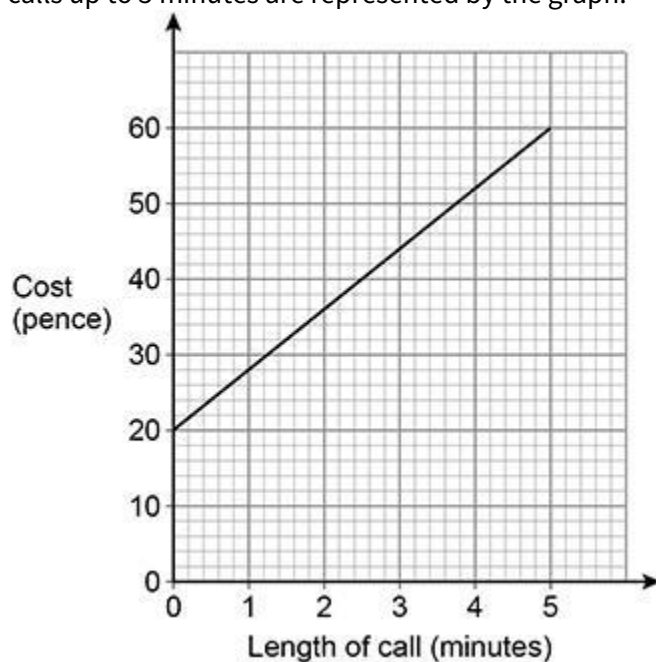
(3)

(Total 5 marks)

Q3.

The cost of making a phone call is
a fixed charge
and
a charge per minute.

The costs of phone calls up to 5 minutes are represented by the graph.



(a) Write down the fixed charge.

Answer _____ pence

(1)

(b) Work out the charge per minute.

Answer _____ pence

(2)

(c) Work out the cost of a phone call lasting 7 minutes.

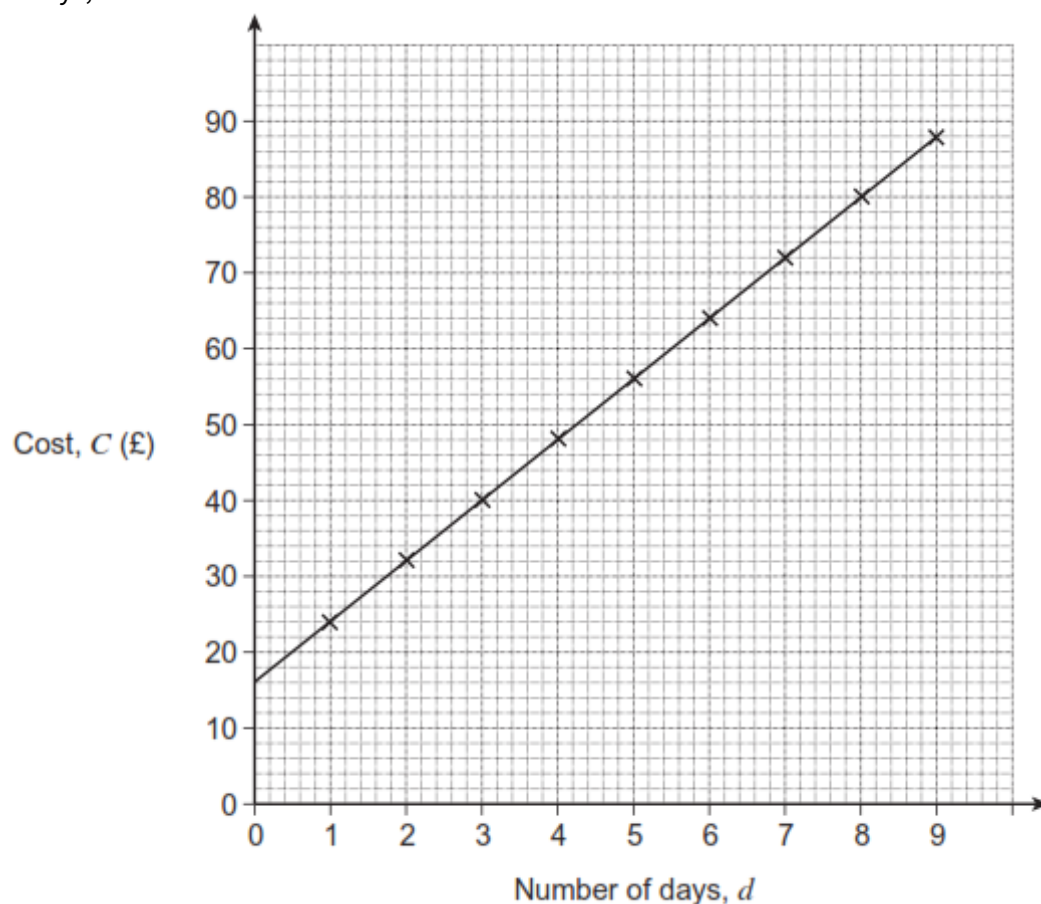
Answer _____ pence

(2)

(Total 5 marks)

Q4.

The graph shows the cost, C (£), of hiring a circular saw from Branch Tool Hire for a number of days, d .



- (a) Circle the correct formula for the cost, C .

$C = 24d$ $C = 8d + 24$ $C = 16d + 8$ $C = 8d + 16$

(1)

- (b) The cost of hiring a circular saw from Woods Tool Hire is given by the formula

$$C = 9d + 11$$

Sam thinks that Woods Tool Hire is always cheaper.

Is this true?

Tick a box.

Yes ☐

No ☐

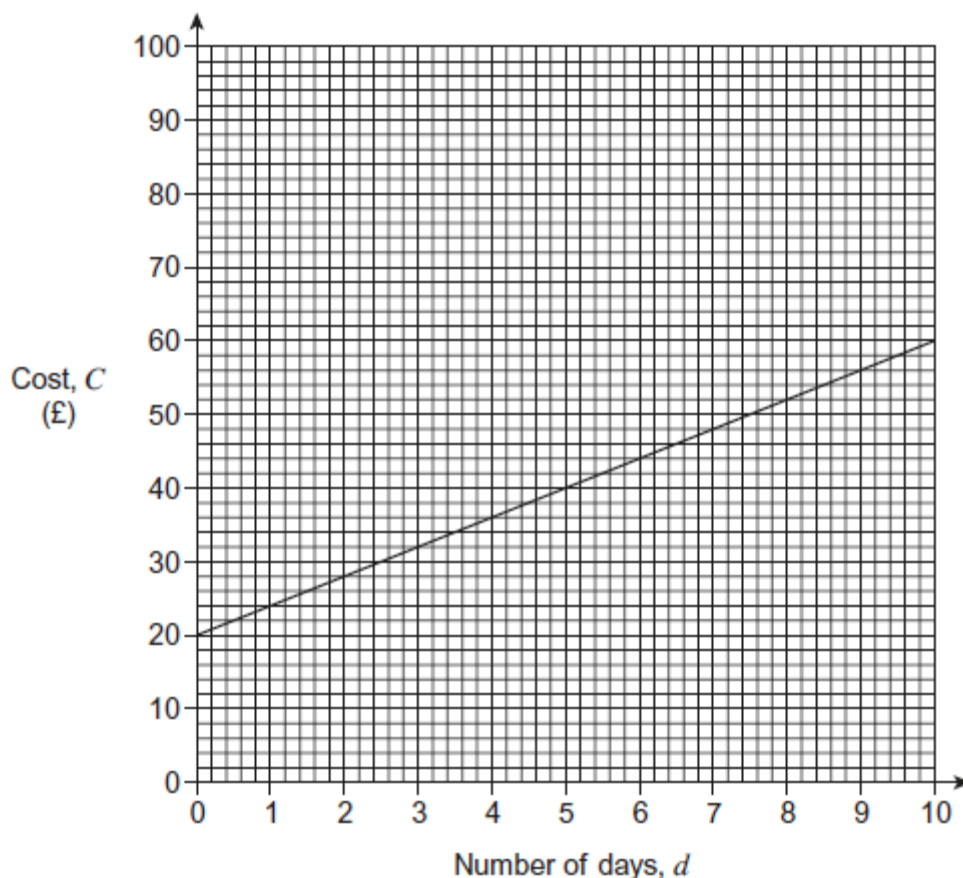
Give reasons for your answer.

(3)

(Total 4 marks)

Q5.

This graph is used to work out the cost, C (£), to hire a drill for a number of days, d .



- (a) Circle the correct formula for the cost, C , to hire a drill.

$C = 20d + 4$ $C = 4d + 24$ $C = 4d + 20$ $C = 24d - 4$

(1)

- (b) The cost of hiring a sander is given by the formula

$C = 6d + 10$

Dev hires a drill and a sander for the **same** number of days.

The **total** cost is £90

Work out the number of days that he hires the drill and sander.

Answer _____ days

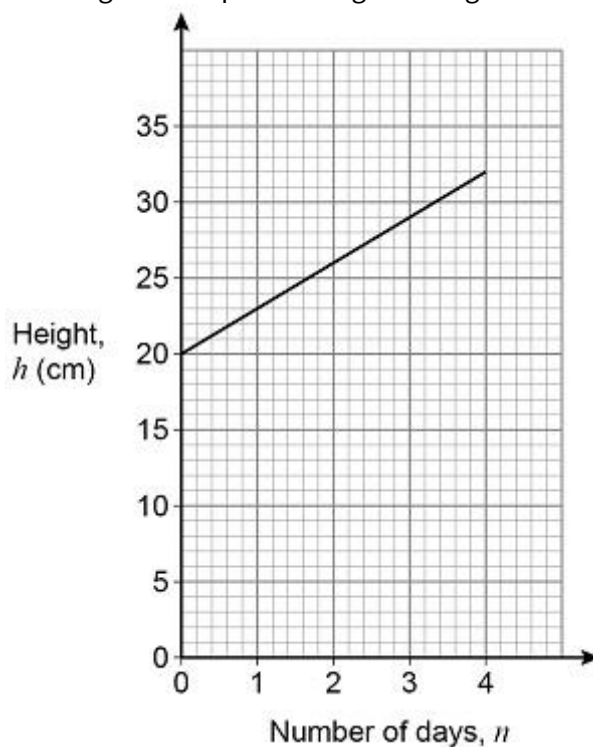
(3)

(Total 4 marks)

Q6.

Jim buys a plant of height 20 cm

The graph shows how the height of the plant changes during the next 4 days.



Work out a formula for h in terms of n .

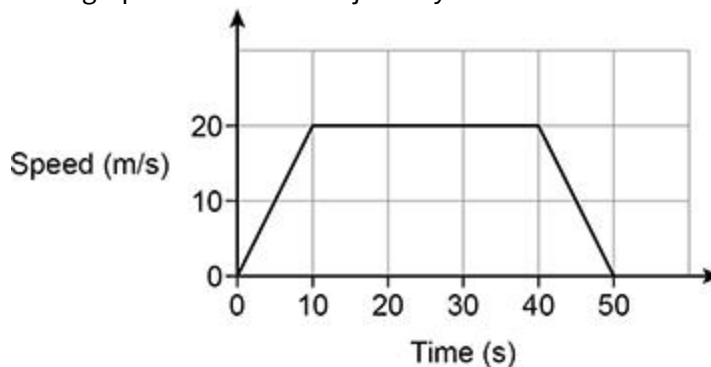
Answer _____

(Total 3 marks)

Questions 7 is **higher** tier only.

Q7.

Here is the speed-time graph for a 50-second journey.



(a) Circle the acceleration, in m/s^2 , halfway through the journey.

0 2 20 25

(1)

(b) Work out the total distance travelled.

Answer _____ m

(2)

(Total 3 marks)

For the rest of the questions, you may use a calculator.

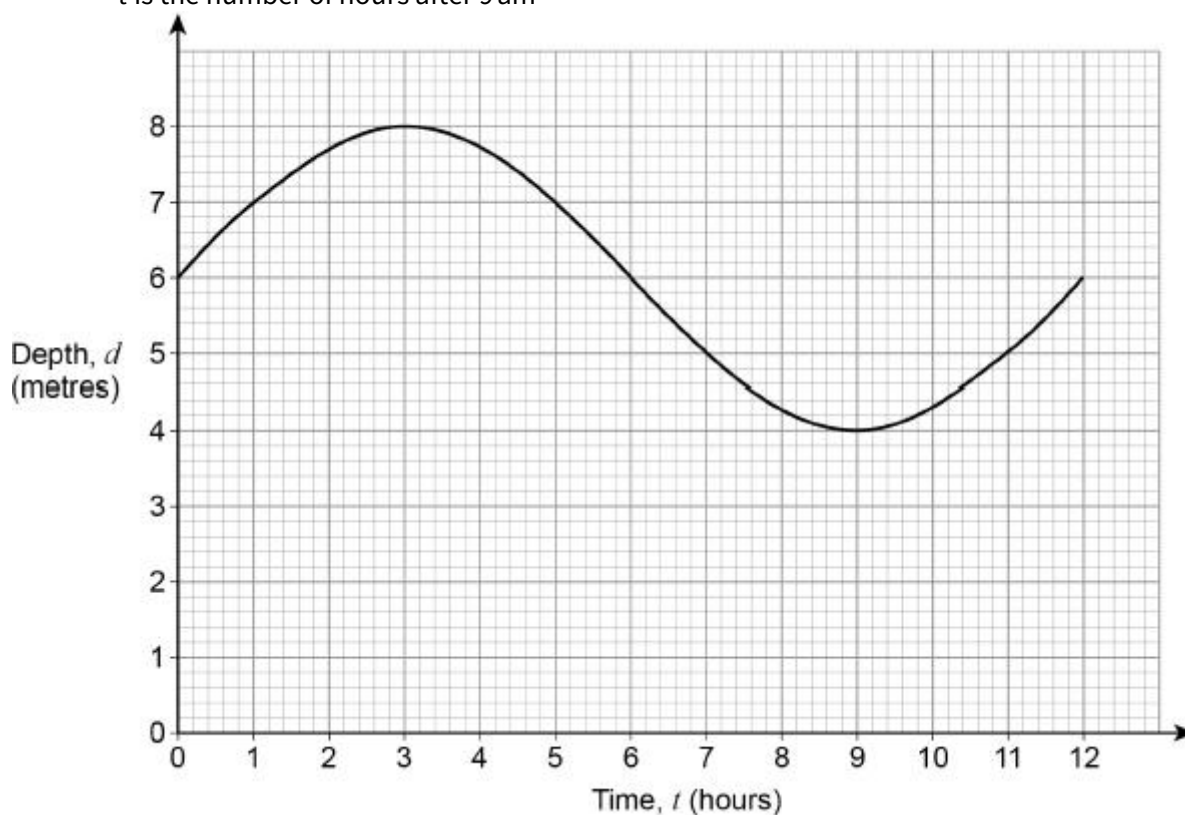


Q8.

The graph shows the depth of water in a harbour for 12 hours.

d is the depth of water in a harbour in metres

t is the number of hours after 9 am



- (a) For how many of the 12 hours is the depth more than 5 metres?

Answer _____

(1)

- (b) By how much does the depth change between 12 noon and 4 pm?

Answer _____ metres

(1)

(Total 2 marks)

Q9.

A tank contains 40 litres of water.

- (a) Water leaks out of the tank at a rate of 1.2 litres per minute.

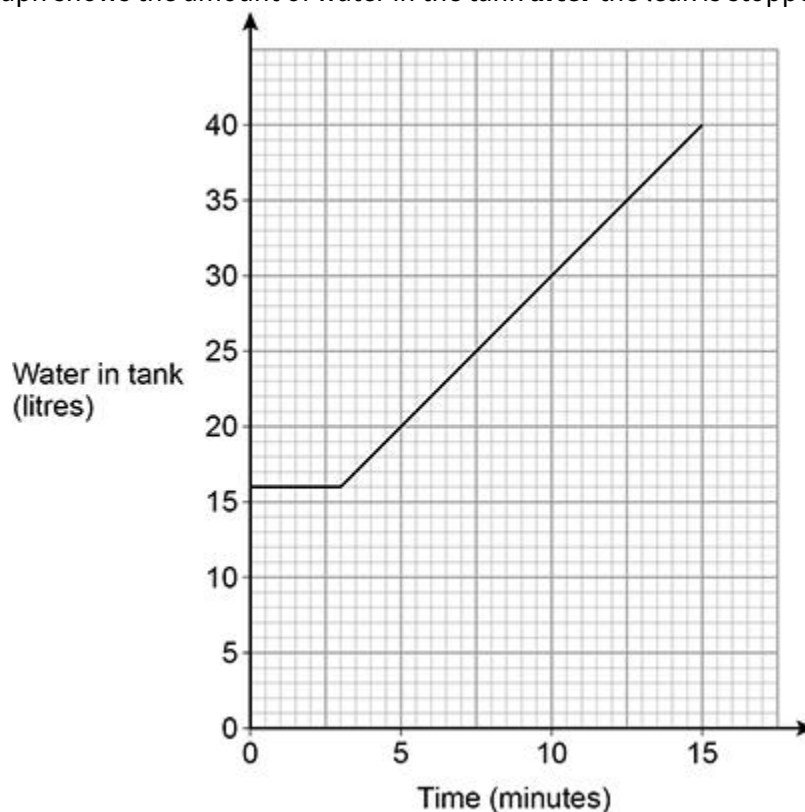
The leak is stopped after 20 minutes.

Show that, when the leak is stopped, the tank contains 16 litres of water.

(1)

- (b) The tank is refilled with water from a tap.

The graph shows the amount of water in the tank **after** the leak is stopped.



Complete this report by writing a number in each answer space.

Report

_____ minutes after the leak is stopped, the tap starts to refill the tank.

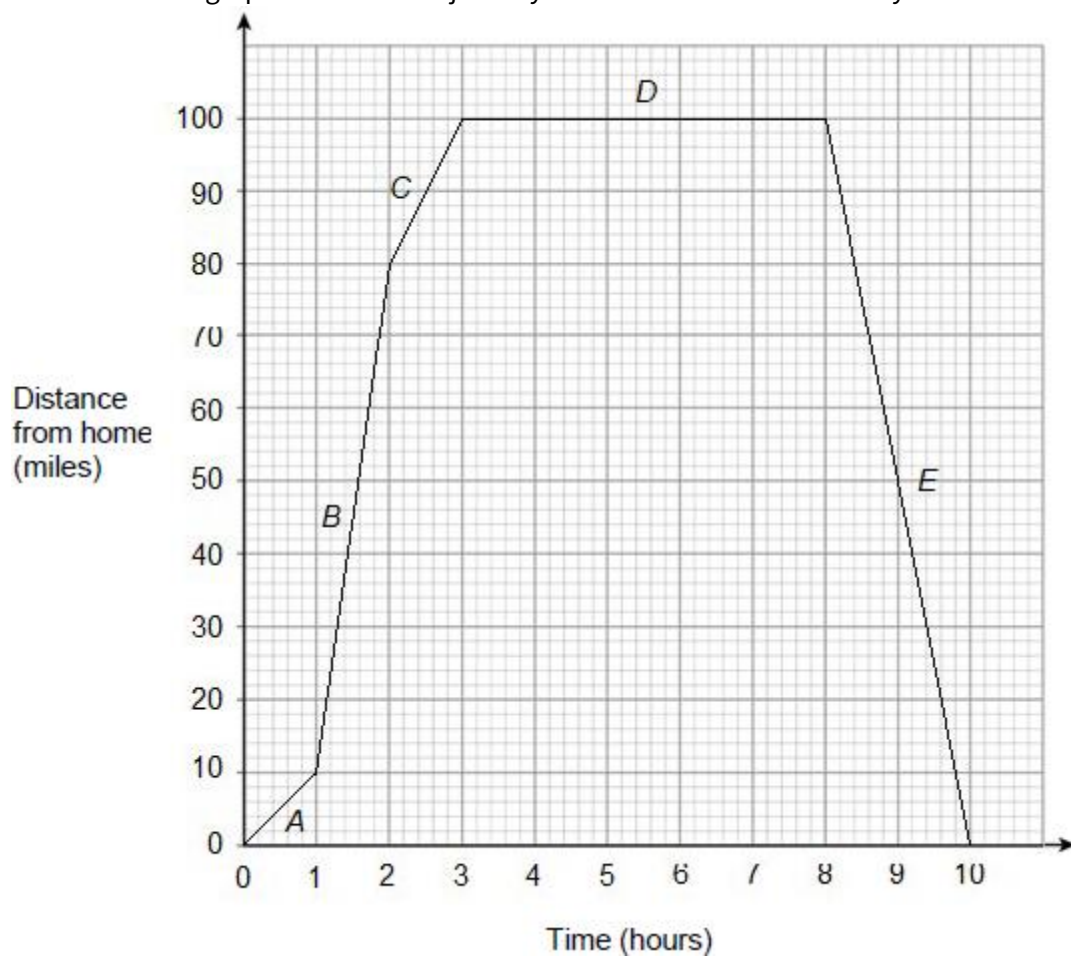
The rate at which the tank refills is _____ litres per minute.

(3)

(Total 4 marks)

Q10.

The distance time graph shows Josh's journey from his house to Canterbury and back.



- (a) Match each statement to one section of the journey.

Average speed = 20 miles per hour

Average speed = 50 miles per hour

Stationary

Fastest part of the journey

(4)

- (b) How far did Josh travel altogether?

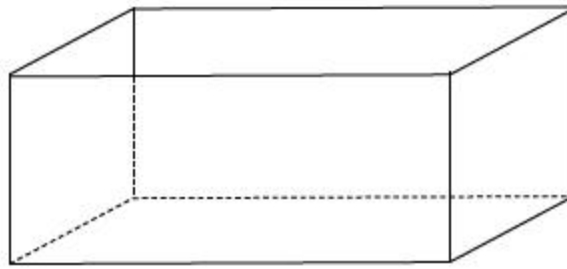
Answer _____ miles

(2)

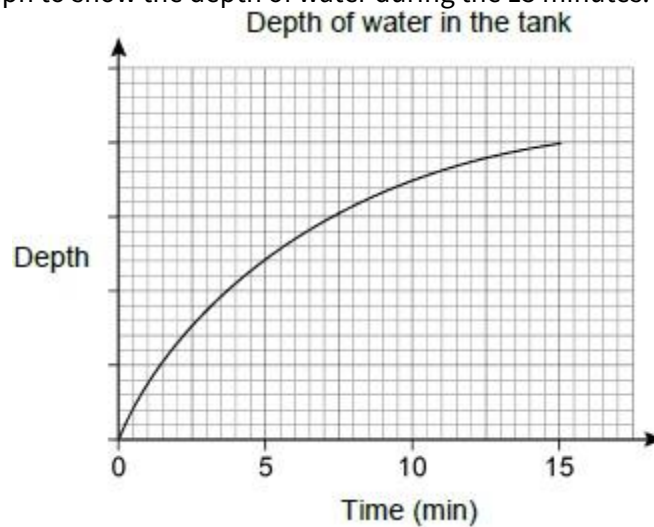
(Total 6 marks)

Q11.

A tank is filled with water at a constant rate.
The tank is a cuboid of height 80 cm.



The tank is full after 15 minutes.
Sita draws this graph to show the depth of water during the 15 minutes.



Make **two** criticisms of Sita's graph.

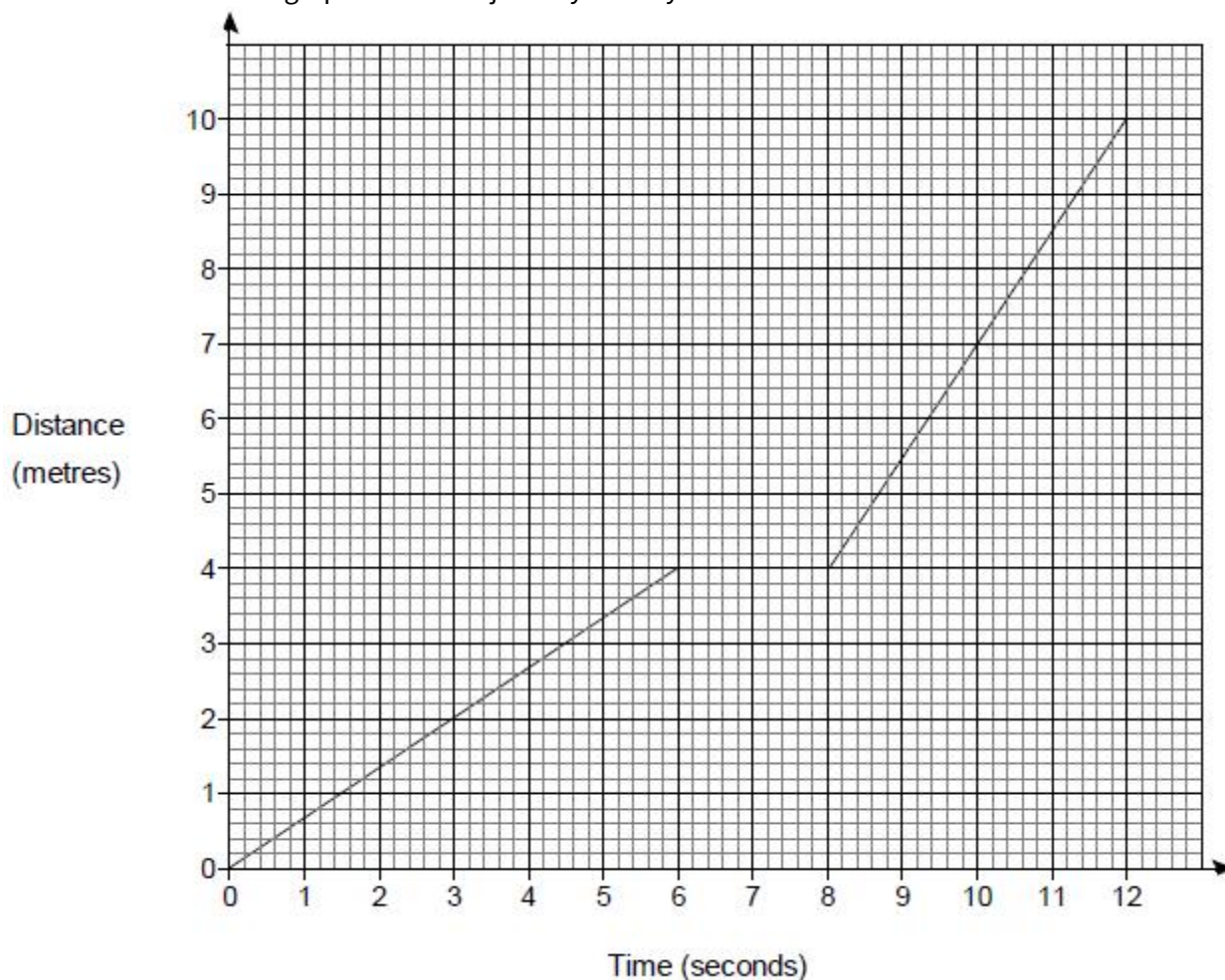
Criticism 1 _____

Criticism 2 _____

(Total 2 marks)

Q12.

The distance-time graph shows the journey of a toy train.



- (a) Here are some descriptions of the first **two** parts of the journey.
Circle the letter of the correct description.

- | | |
|---|--|
| A Accelerates then stationary | B Moves at constant speed then stationary |
| C Accelerates then moves at constant speed | D Stationary then moves at constant speed |

(1)

- (b) Work out the average speed for the last four seconds of the journey.

Answer m/s

(2)

(Total 3 marks)

Q13.

A company has bikes for hire.

The cost, £C, to hire a bike for n days is given by the formula

$$C = 12 + \frac{27}{4}(n - 1)$$

- (a) Write down the cost to hire a bike for 1 day.

Answer £ _____

(1)

- (b)

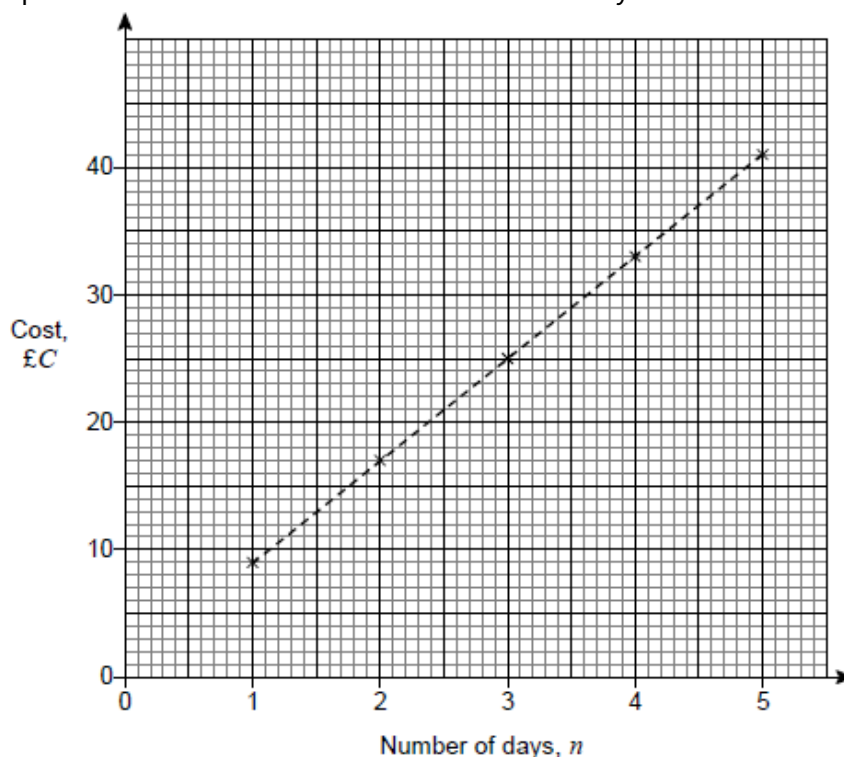
Special offer
Hire a bike for £9 per day

Is it cheaper to hire a bike for 7 days using the special offer?

You **must** show your working.

(2)

- (c) The graph shows the cost to hire a bike for one to five days at a different company.



The cost, £C, to hire a bike for n days using this company is given by the formula

$$C = a + b(n - 1)$$

Work out the values of a and b .

$a =$ _____

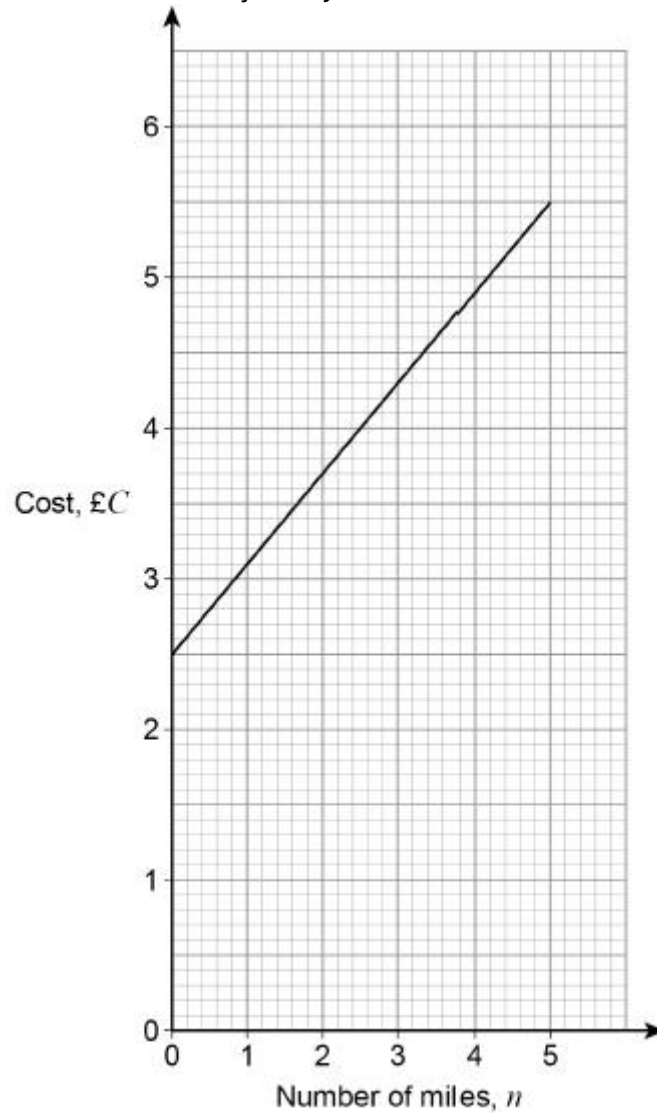
$b =$ _____

(3)

(Total 6 marks)

Q14.

The graph shows the cost of some taxi journeys.



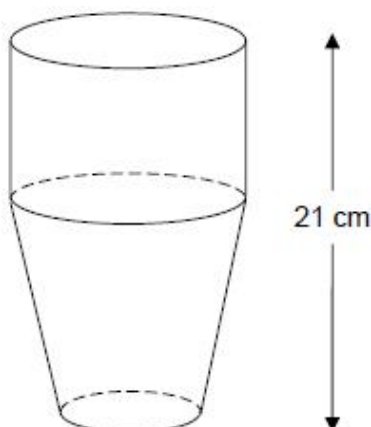
Work out a formula for C in terms of n .

Answer _____

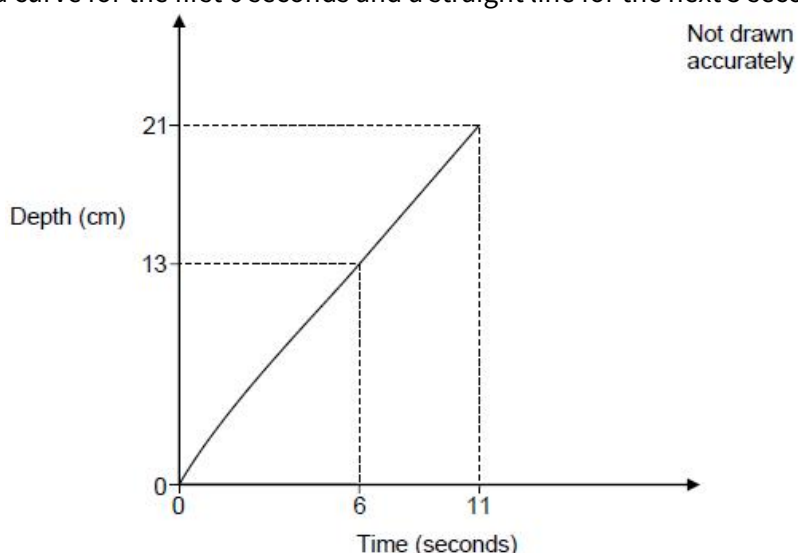
(Total 3 marks)

Q15.

The diagram shows an empty container of height 21 cm
The container consists of a cylinder on a frustum of a cone.



Water is added to the container at a constant rate for 11 seconds.
The sketch graph shows the depth of the water as the container fills.
The graph is a curve for the first 6 seconds and a straight line for the next 5 seconds.



(a) Circle the height of the cylinder.

8 cm 10.5 cm 13 cm 21 cm

(1)

(b) Work out the rate of increase of the depth of the water between 6 seconds and 11 seconds.

State the units of your answer.

Answer _____

(3)

(Total 4 marks)

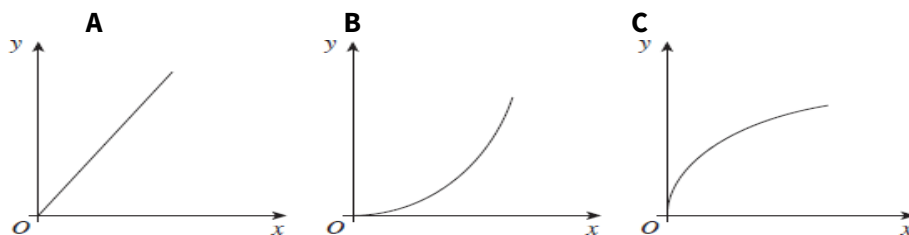
Questions 16 to 18 are **higher** tier only.

Q16.

The fare, £ y , for a journey is directly proportional to the square root of the distance, x miles.

- (a) Which sketch graph represents this information?

Circle the correct letter.



(1)

- (b) A 100 mile journey costs £36

What is the cost of a 250 mile journey?

Give your answer to the nearest pound.

Answer £ _____

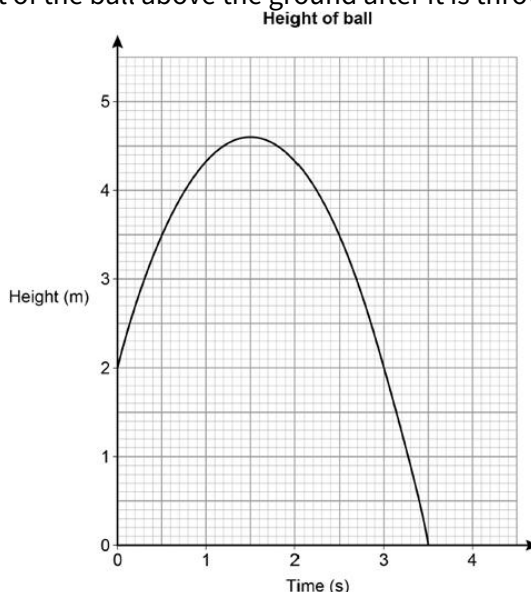
(4)

(Total 5 marks)

Q17.

A ball is thrown vertically upwards.

The graph shows the height of the ball above the ground after it is thrown.



- (a) For how many seconds is the ball at a height of **more than** 2 metres?

Answer _____ s

(1)

- (b) After how many seconds is the ball at instantaneous rest when it is in the air?

Answer _____ s

(1)

- (c) Work out the average speed of the ball when it is moving downwards.

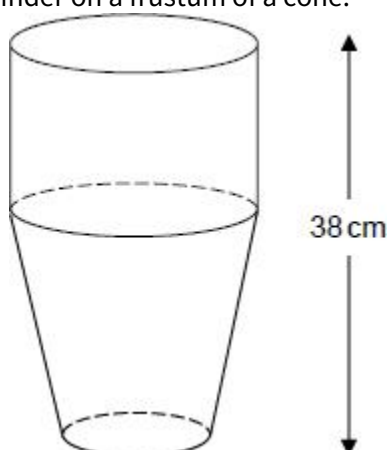
Answer _____ m/s

(2)

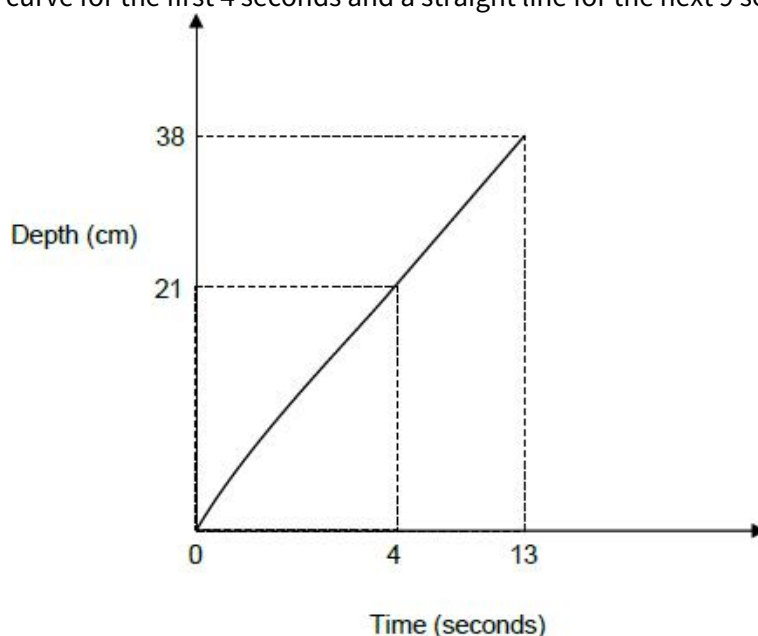
(Total 4 marks)

Q18.

The diagram shows an empty container of height 38 cm.
The container consists of a cylinder on a frustum of a cone.



Water is added to the container at a constant rate for 13 seconds.
The sketch graph shows the depth of the water as the container fills.
The graph is a curve for the first 4 seconds and a straight line for the next 9 seconds.



Not drawn accurately

- (a) Circle the height of the cylinder.

17 cm

19 cm

21 cm

38 cm

(1)

- (b) Work out the rate of increase of the depth of the water between 4 seconds and 13 seconds.

State the units of your answer.

Answer _____

(3)

(Total 4 marks)