Question	Mark	Out of
1		2
2		4
3		5
4		2
5		2
6		4
7		4
8		4
9		5
10		4
11		5
12		4
13		3
14		4
15		4
16		4
17		4
18		4
19		6
20		6
Total		80

the PiXL club
partners in excellence

Pre Public Examination

GCSE Mathematics (Edexcel style)
May 2017
Higher Tier
Paper 2H
Worked Solutions

Name   …………………………………………………………………

Class   …………………………………………………………………

TIME ALLOWED
1 hour 30 minutes
INSTRUCTIONS TO CANDIDATES

- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- **You are permitted to use a calculator in this paper.**
- Do all rough work in this book.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **( )** at the end of each question or part question on the Question Paper**.**
- **You are reminded of the need for clear presentation in your answers.**
- The total number of marks for this paper is **80**.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

Question 1.

A cricket team played eight innings.

The mean number of runs for the eight innings is 20

The cricket team played one more inning.

The mean number of runs for all nine innings is 23

Work out the number of runs the team made in the ninth inning.

20 x 8 = 160 or 23 x 9 = 207 M1

207 – 160 = 47

47   A1

(Total 2 marks)

Question 2.

The width of a rectangular sports pitch is x metres, where x is an integer.

The length of the pitch is 20 m more than its width.

Given that the perimeter of the pitch must be less than 300 m

Find the greatest possible width of the rectangular sports pitch.

$x + 20$ B1

$2(x) + 2(x+20) = 4x + 40$ M1

$4x + 40 < 300$

$4x < 260$

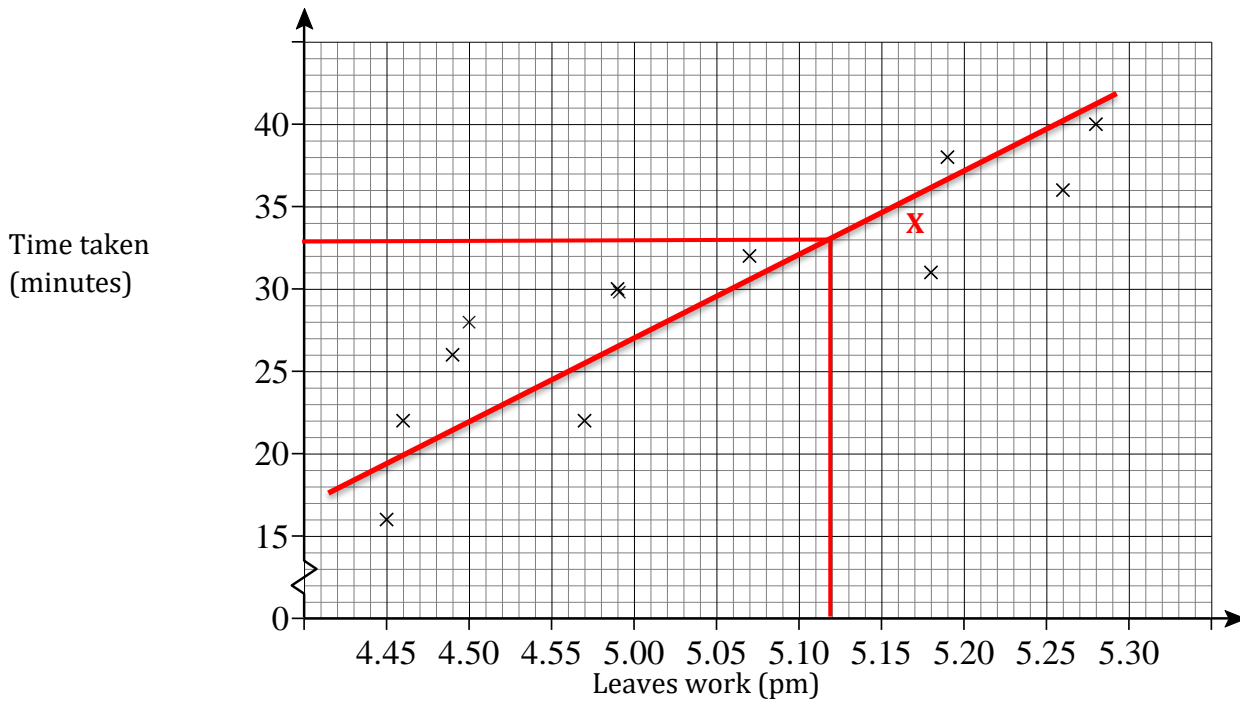**$x < 65$ A1**

64m B1

(Total 4 marks)

Question 3.

Becky cycles home from work each day.

The scatter graph shows information about her journey times.

(*a*) The table shows one more set of journey times.

Leaves work (pm)	5.17
Arrives home (pm)	5.51

Complete the scatter graph using the data from the table. **B1**

(1)

(*b*) Describe the correlation.

Positive B1

(1)

(*c*) Becky leaves work at 5.12 pm
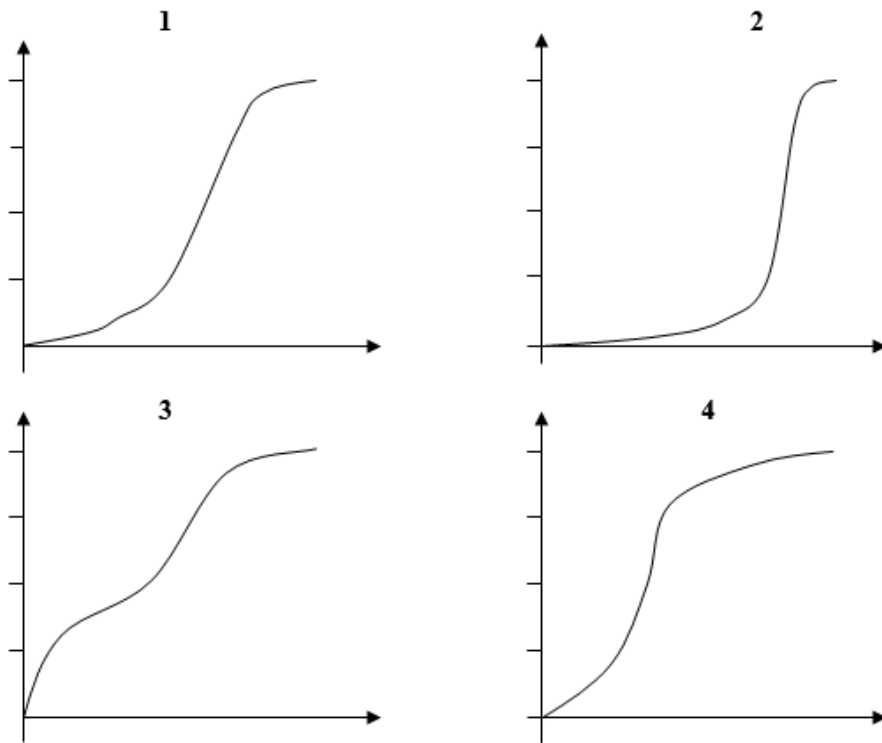
What time will Sara arrive home.

Correct line of best fit **B1**

30 min – 34 min **M1**
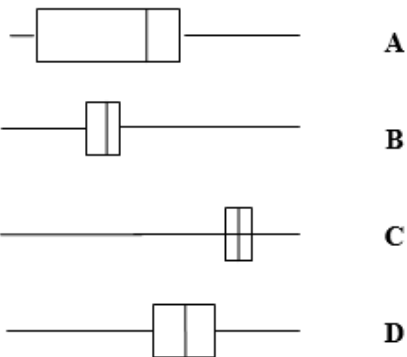
5.42pm – 5.46pm **A1**

(3)

(Total 5 marks)

3

Question 4.

Here are four cumulative frequency diagrams.

Here are four box plots.

For each box plot write down the number of the appropriate cumulative frequency diagram.

A & 3

B & 4

C & 2

D & 1

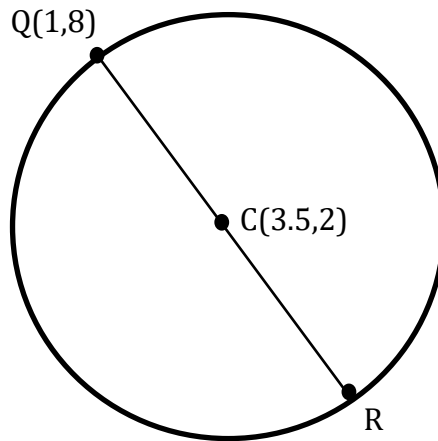**B2 for all correct**

B1 for two correct

(Total 2 marks)

Question 5.

Below is a diagram of a circle.

QR is the diameter of the circle and C is the centre of the circle.

Find the coordinates of point R.

Q(1,8)

C(3.5,2)

R

3.5 x 2 = 7

7 – 1 = 6

2 x 2 = 4

4 – 8 = -4   M1

(6,-4) A1
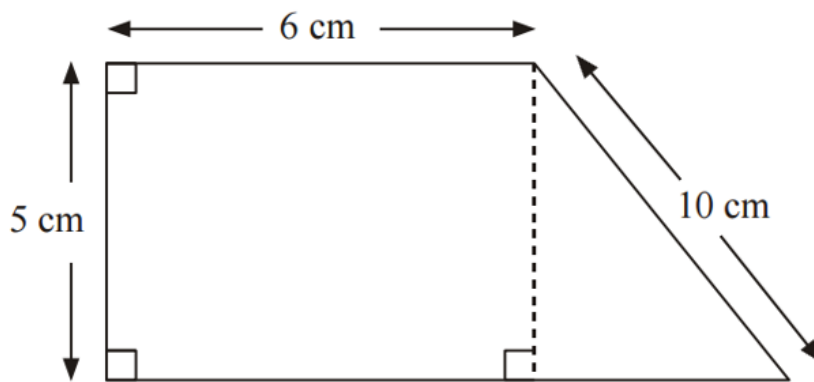
(Total 2 marks)

Question 6.

Here is a trapezium.

Diagram **NOT**
accurately drawn

Work out the area of the trapezium.

Give your answer correct to 3 significant figures.

$10^2 - 5^2 = 75$ **P1**

$\sqrt{75} = 5\sqrt{3}$ or 8.660254038

$5 \times 6 = 30\text{cm}^2$ **M1**

$(5 \times 5\sqrt{3}) \div 2 = 21.65063509$

$30 + 21.6506\ldots = 51.6506\ldots$ **M1**

51.7cm²   A1

(Total 4 marks)

Question 7.

Dave imports cars from Australia.

He sells them in the UK. He has just bought a car in Australia costing $25 000.

It cost him £900 to import the car to the UK.

The exchange rate is £1 = $1.25

Dave needs to make a profit of 15% on his total costs.

Work out the least amount that Dave must sell the car for in the UK.

Give your answer in pounds.

$25000 ÷ $1.25 = £20000   **P1**

20000 + 900 = £20900   **M1**

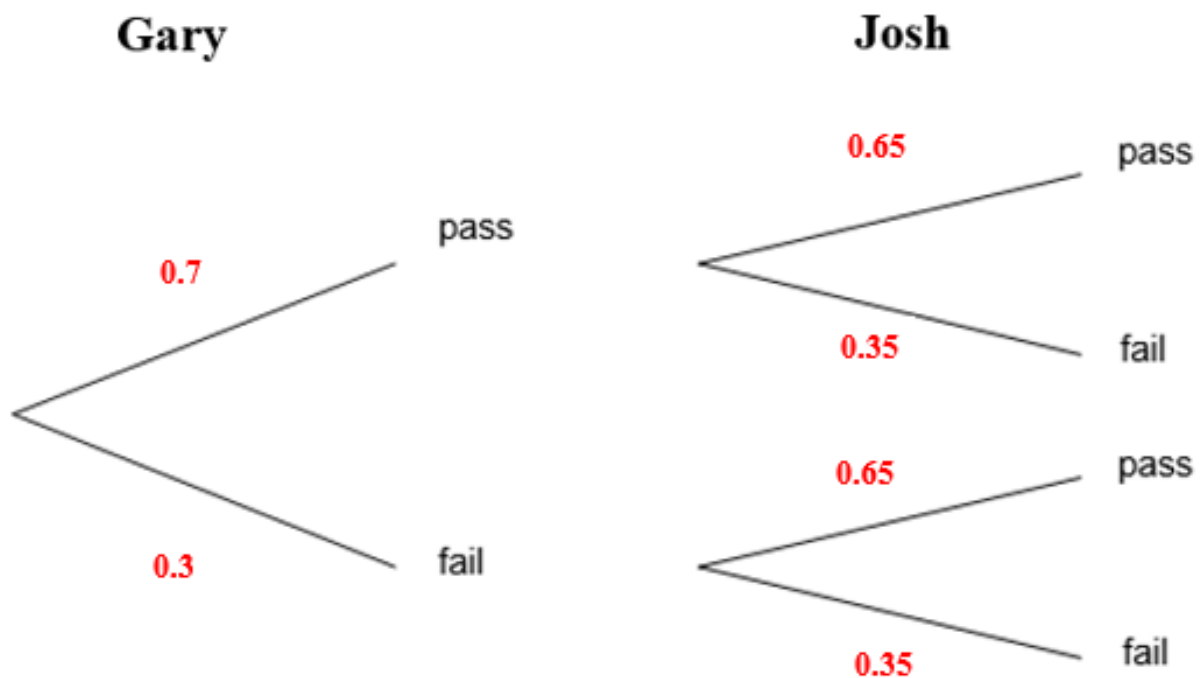20900 x 1.15 =   **M1**

£24035   A1

(Total 4 marks)

Question 8.

Gary has a 70% chance of passing his maths test.

Josh has a 65% chance of passing his maths test.

(a) Complete the probability tree diagram.

(2)

B2 for all correct entries on probability tree

B1 for at least 4 correct entries on probability tree

(b) Work out the probability that Gary and Josh both pass their maths test.

0.7 x 0.65   M1

0.455   A1

(2)

(Total 4 marks)

Question 9.
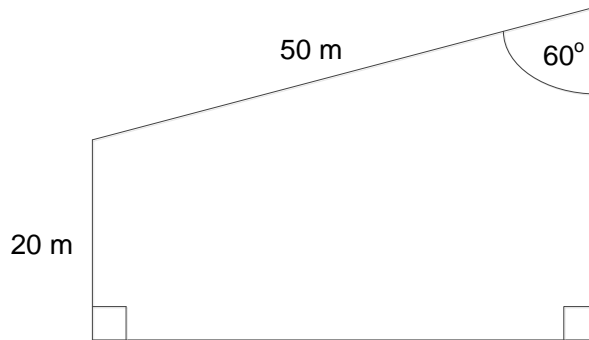
The diagram shows a plot of land.

50 m

60°

Diagram **NOT**
accurately drawn

20 m

A fence is built on the perimeter of the land.

The fence costs £11.45 per metre.

Work out the cost of building the fence.

50 x sin(60) = 43.30127019   **P1**

50 x cos(60) = 25   **M1**

Perimeter = 50 + 20 + 43.30.. + 20 + 25   **M1**

         = 158.3012702

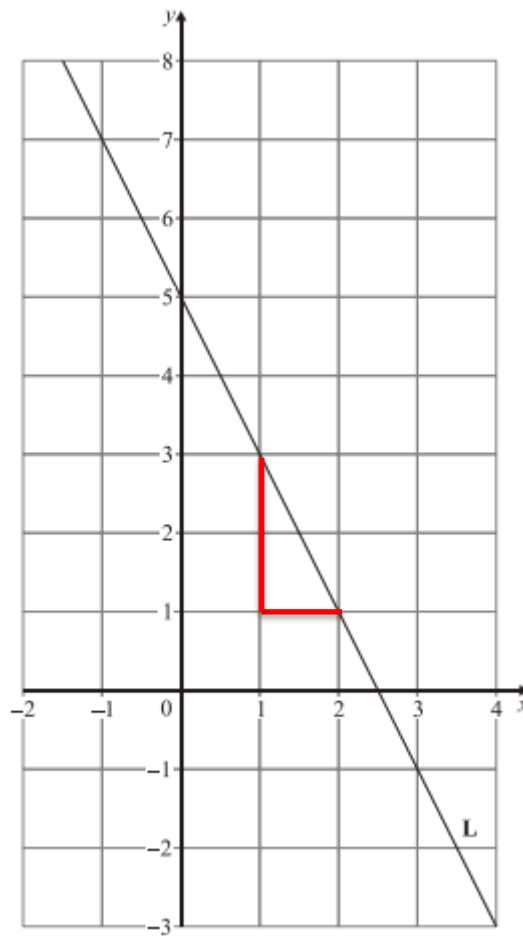**158.30… x 11.45 (= 1812.549544)**   **M1**

£1812.55   A1

(Total 5 marks)

Question 10.

The line **L** is drawn below.

Find an equation of the line perpendicular to line **L** that passes through the point (1, 1).

Gradient of L = -2   **M1**

Perpendicular Gradient $= \dfrac{1}{2}$ **M1**

$y = \dfrac{1}{2}x + c$

Substitute in (1,1)   **M1**

$y = \dfrac{1}{2}x + \dfrac{1}{2}$ **A1**

(Total 4 marks)

Question 11.

Julia and Steve go to the furniture store.

Julia purchases 2 tables and 3 chairs.

She pays a total of £2000.

Steve purchases 3 tables and 2 chairs.

He pays a total of £2500.

Find the cost of each table and a chair.

2t + 3c = 2000   M1 for attempt to use variables

3t + 2c = 2500   A1 for both correct equations

4t + 6c = 4000   M1 for correct process to eliminate

9t + 6c = 7500

5t = 3500

t = 700

2(700) + 3c = 2000   M1 for substituting found value into either equation

3c = 600

c = 200

Table £700 and Chair £200 A1

(Total 5 marks)

Question 12.

The mass of a sphere, M, is directly proportional to the cube of r, where r is the radius of the sphere in cm

When $r = 10$ cm, $M = 200$ grams.

Work out the mass of a sphere, made of the same material, with a radius of 15 cm.

M α r³ or M = k r³   **M1**

200 = k (10³)

k = $\frac{1}{5}$ **B1**

M = $\frac{1}{5}$ r³

M = $\frac{1}{5}$ (15³)   **M1**

675g   A1

(Total 4 marks)

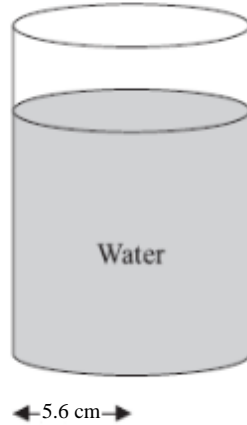**Question 13.**

Here is a vase in the shape of a cylinder.

Diagram **NOT**
accurately drawn

The vase has a radius of 5.6 cm.

There is 1250 cm^3 of water in the vase.

Work out the depth of the water in the vase.

Give your answer correct to 1 decimal place.

$\pi 5.6^2$ x h   **P1**

$31.36\pi h = 1250$

$h = 1250 \div 31.36\pi$ M1

12.7cm   A1

(Total 3 marks)
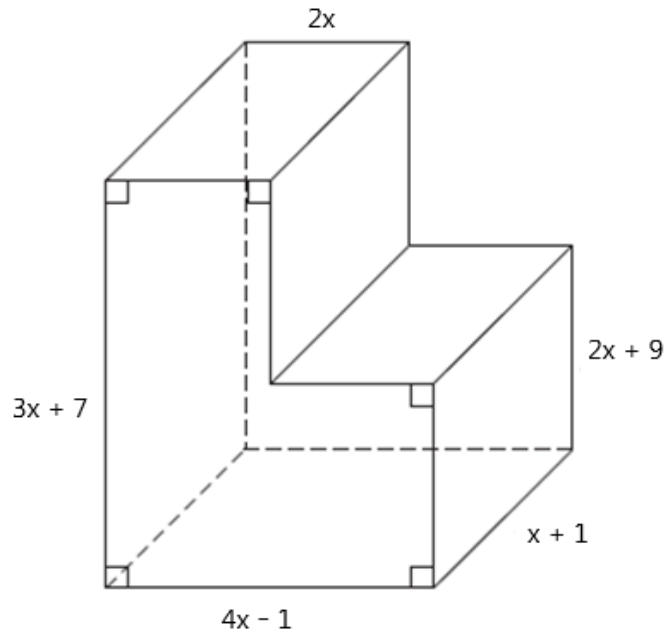
Question 14.

The diagram shows an L-shaped prism.

2x

Diagram **NOT** accurately drawn

2x + 9

3x + 7

x + 1

4x – 1

All measurements are in centimetres.

Find an expression, in terms of x, for the volume, in cm^3, of the prism.

You must show your working.

Give your answer in its simplest form.

2x – 1 or x – 2   **M1 find a missing length**

2x (3x + 7) + (2x - 1) (2x + 9)   **M1 for a correct expression for one area of the cross section**

$6x^2 + 14x + 4x^2 + 18x - 2x - 9$

$10x^2 + 30x - 9$

$(10x^2 + 30x - 9) (x + 1)$ **M1 for complete method to find the volume**

$10x^3 + 40x^2 + 21x - 9$ A1

(Total 4 marks)

Question 15.

Make *a* the subject of the formula

$$P = \frac{n^2 + a}{n + a}$$

$p(n + a) = n^2 + a$ **M1**

$pn + pa = n^2 + a$

$pa - a = n^2 - pn$ **M1**

$a(p - 1) = n^2 - pn$ **M1**

$a = \frac{n^2 - pn}{p - 1}$ **A1**

(Total 4 marks)

Question 16.

Prove that, for all positive values of *n*,

$$\tfrac{1}{4}(2n + 1)(n + 4) - \tfrac{1}{4}n(2n + 1) = 2n + 1$$

$\tfrac{1}{4}(2n^2 + 9n + 4)$ or $\tfrac{1}{4}(2n^2 + n)$ **M1 for either one**

$\tfrac{1}{2}n^2 + \tfrac{9}{4}n + 1 - (\tfrac{1}{2}n^2 + \tfrac{1}{4}n)$ **M1**

$\tfrac{1}{2}n^2 + \tfrac{9}{4}n + 1 - \tfrac{1}{2}n^2 - \tfrac{1}{4}n$ **M1 for fully correct expansion**
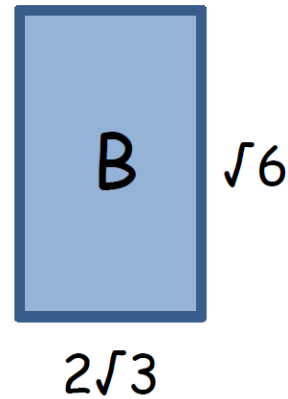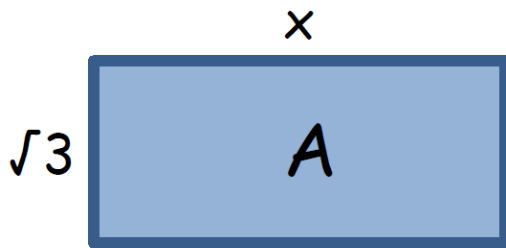
$\tfrac{8}{4}n + 1 = 2n + 1$ **C1 for complete and correct proof**

(Total 4 marks)

Question 17.

The area of rectangle A is the same as the area of rectangle B.

Find the value of x.

Give your answer in the form a√6.

You must show all your working.

Area A = $\sqrt{3}x$

Area B = $2\sqrt{3} \times \sqrt{6} = 6\sqrt{2}$ M1

$\sqrt{3}x = 6\sqrt{2}$ M1

$x = \frac{6\sqrt{2}}{\sqrt{3}}$

multiply top & bottom $\sqrt{3}$ M1

$x = \frac{6\sqrt{6}}{3}$

x = $2\sqrt{6}$ A1

(Total 4 marks)

Question 18.

Emma drops a ball from a height of *d* metres onto the ground.

The time, *t* seconds, that the ball takes to reach the ground is given by

$$t = \sqrt{\frac{2d}{g}}$$

where *g* m/s^2 is the acceleration due to gravity.

d = 34.2 correct to 3 significant figures.

g = 7.6 correct to 2 significant figures.

(*a*) Write down the upper bound of *g*.

7.65   B1

(1)

(*b*) Calculate the lower bound of *t*.

You must show all your working.

d = **34.15   B1**

$t = \sqrt{\frac{2 \times 34.15}{7.65}}$ **M1**
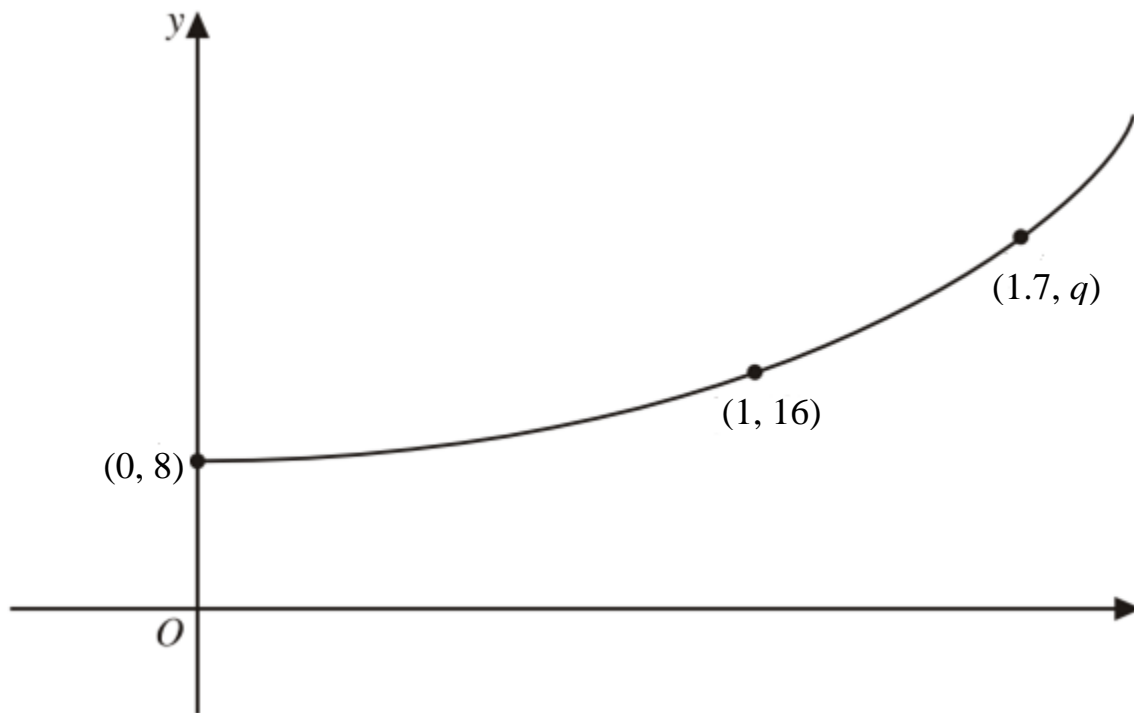
t = **2.987…   A1**

(3)

(Total 4 marks)

Question 19.

This sketch shows part of the graph with equation $= ab^x$, where a and b are constants.

The points with coordinates (0, 8), (1, 16) and (1.7, q) lie on the graph.

Calculate the values of a, b and q.

$8 = ab^0$ **M1**

$b^0 = 1$

$a = 8$ **A1**

$16 = ab^1$

$16 = 8b$ **M1**

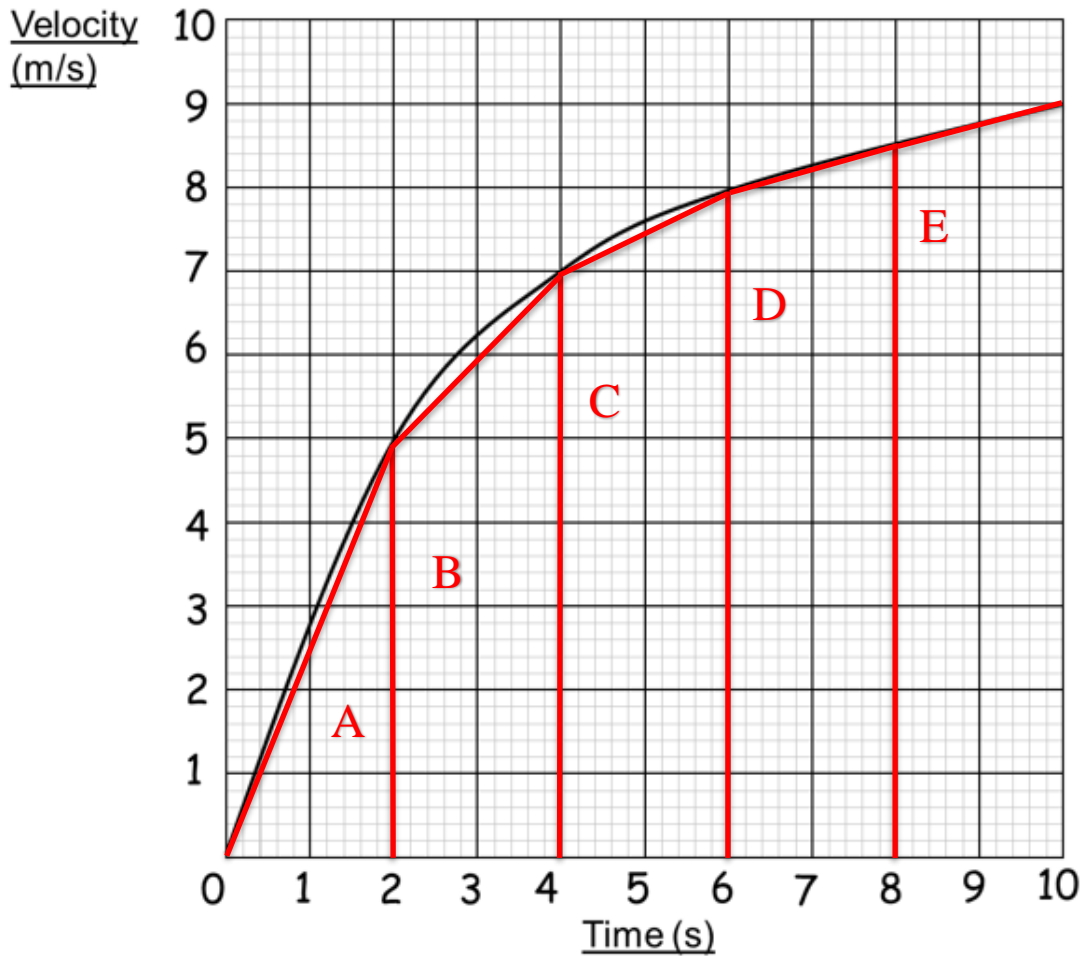$b = 2$ **A1**

$q = ab^{1.7}$

$q = (8)(2)^{1.7}$ **M1**

$q = 25.99$ or 26 **A1**

(Total 6 marks)

Question 20.

The graph below shows the first 10 seconds of a cyclists' journey.

(a) Calculate an estimate for the distance travelled by the cyclist in these 10 seconds.

Use 5 strips of equal widths.

Area A = $\frac{2 \times 5}{2}$ = 5   C1

Area B = $\frac{(5+7) \times 2}{2}$ = 12   M1

Area C = $\frac{(7+8) \times 2}{2}$ = 15

Area D = $\frac{(8+8.5) \times 2}{2}$ = 16.5

Area E = $\frac{(8.5+9) \times 2}{2}$ = 17.5 M1

5 + 12 + 15 + 16.5 + 17.5 =

66 A1

(4)

(b) Is this area an overestimate or underestimate for the distance travelled?

You must explain your answer.

Underestimate   **B1**

Curve bends outwards   **C1**

(2)

(Total 6 marks)

TOTAL FOR PAPER IS 80 MARKS