

### Task 3

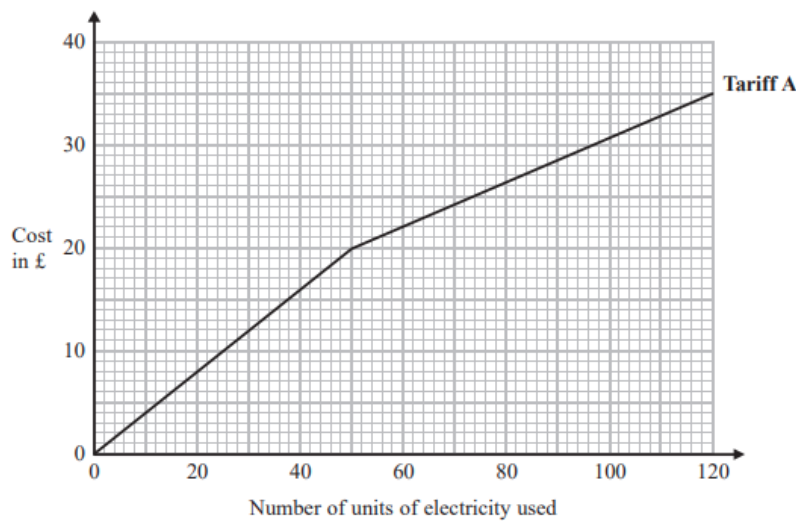
#### Question 1

**Skill involved: 270f:** Determine the gradient of a straight line which is drawn on axes with unusual scale.

[Edexcel Linked Pair June 2017 Applications 1F Q17a, Applications 1H Q2a]

Beth pays on Tariff A for the number of units of electricity she uses.

She can use this graph to find out how much she pays each month.



How much does Beth pay for each unit of electricity she uses up to a total of 50 units?

£ .....

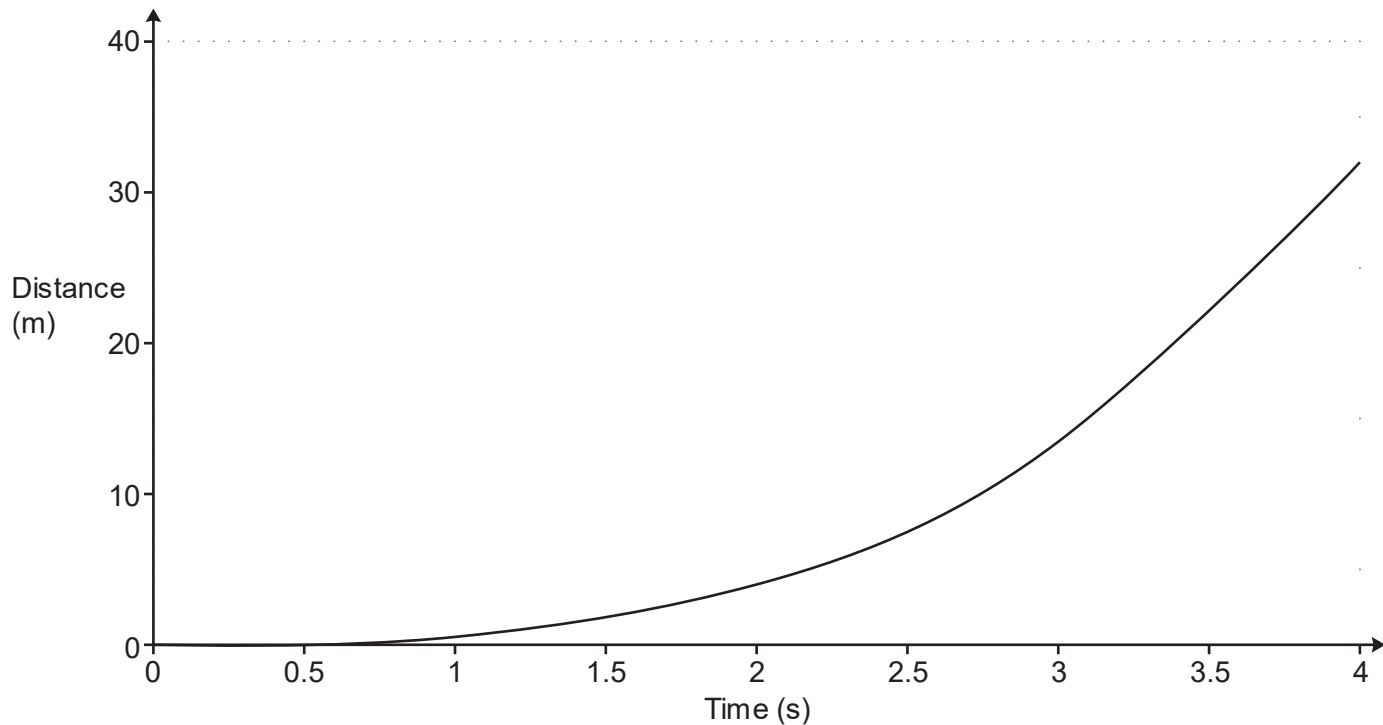
(2 marks)

#### Question 2

**Skill involved: 461i:** Interpret the gradient of a curve in contexts outside of speed-time graphs.

[OCR GCSE Mathematics (9-1) Jun 2024 Higher P4 Q18biii]

The graph shows the distance travelled by an object during the first 4 seconds of its motion.



What happens to the speed of this object during these 4 seconds of motion.  
Explain how you know.

The speed .....

I know this because .....

**(1 mark)**

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### Question 3

**Skill involved: 265b: Find the midpoint of two points given as coordinates.**

*[OCR Additional Maths June 2010 Q9i]*

The diameter of a circle is PQ, where P and Q are the points (1,3) and (15,1) respectively.

Find the centre of the circle.

**(..... , .....)**

**(2 marks)**

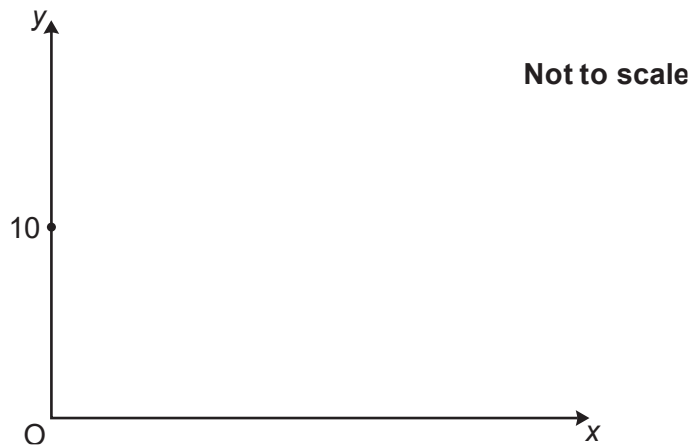
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### Question 4

**Skill involved: 289a: Use Pythagoras' theorem to find the distance between two points.**

*[OCR GCSE Mathematics (9-1) Jun 2024 Higher P6 Q14]*

The sketch shows the coordinate axes and the point (0,10).



The distance from the point  $(0, 10)$  to a point  $(12, t)$  is 12.5 units.

Work out the **two** possible values of  $t$ .

You must show your working and you may use the sketch to help.

$t = \dots\dots\dots$

or  $t = \dots\dots\dots$

**(5 marks)**

### Question 5

**Skill involved: 274d: Find an equation of a line parallel to another in the form  $y = mx + c$**

*[AQA IGCSE FM SAM 2020 P2 Q7]*

Work out the equation of the straight line that is parallel to the line  $2y = x$  and intersects the  $x$ -axis at  $(4, 0)$ .

.....

**(3 marks)**

### Question 6

**Skill involved: 445i: Determine a missing coordinate on a line given another is perpendicular to it.**

*[Edexcel IGCSE Jan 2020 1H Q22]*

Triangle  $HJK$  is isosceles with  $HJ = HK$  and  $JK = \sqrt{80}$

$H$  is the point with coordinates  $(-4, 1)$

$J$  is the point with coordinates  $(j, 15)$  where  $j < 0$

$K$  is the point with coordinates  $(6, k)$

$M$  is the midpoint of  $JK$ .

The gradient of  $HM$  is 2

Find the value of  $j$  and the value of  $k$ .

$j =$  .....

$k =$  .....

**(6 marks)**

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## Mark scheme

### Question 1

£0.40

|       |   |                                                                                   |
|-------|---|-----------------------------------------------------------------------------------|
| £0.40 | 2 | M1 for $20 \div 50$ oe or clear attempt to find gradient<br>A1 for £0.4(0) or 40p |
|-------|---|-----------------------------------------------------------------------------------|

### Question 2

The speed **increases**

I know this because **the gradient gets steeper OR [[gradient OR line] AND [steeper OR greater OR bigger]]**

|     |       |                                                                             |   |                                                                               |
|-----|-------|-----------------------------------------------------------------------------|---|-------------------------------------------------------------------------------|
| (b) | (iii) | [the speed] increases oe<br>[because] the gradient is<br>steeper/greater oe | 1 | Accept any correct response, accept<br>accelerates for increase, see appendix |
|-----|-------|-----------------------------------------------------------------------------|---|-------------------------------------------------------------------------------|

|                                                                | Mark |
|----------------------------------------------------------------|------|
| Increases and gradient is steeper/greater                      | 1    |
| Accelerates as curve is getting steeper                        | 1    |
| Increases as the distance per second increases                 | 1    |
| Increases as the distance travelled in the same time increases | 1    |
| Increases and curve goes upwards                               | 0    |

### Question 3

( 8 , 2 )

|                                                                                                                         |          |
|-------------------------------------------------------------------------------------------------------------------------|----------|
| Centre is $\left(\frac{1+15}{2}, \frac{3+1}{2}\right) = (8, 2)$                                                         | B1<br>B1 |
| Nb Working with vectors to give diameter = [14,2]<br>and so radius = [7,1] giving centre (15 – 7, 3 – 1) is<br>correct. | 2        |

### Question 4

$t = 13.5$  or  $t = 6.5$

13.5 and 6.5 with correct working

5

**M2** for  $[h^2 =] 12.5^2 - 12^2$  or better  
or **M1** for  $12^2 + h^2 = 12.5^2$  or better

**B1** for  $h = 3.5$

AND

**M1** for 10 + *their* 3.5 soi by 13.5 or 10 – *their* 3.5 soi by 6.5

If **0**, **1** or **2** scored, instead award  
**SC3** for both 13.5 and 6.5 as answers with  
no or insufficient working

If **0** or **1** scored, instead award  
**SC2** for either 13.5 or 6.5 as answer with no  
working or insufficient working

'Correct working' requires  
evidence of Pythagorean  
quadratic

Accept  $\frac{27}{2}$  and  $\frac{13}{2}$

Allow other letters or  
and allocate marks as  
method

Accept -3.5 or  $\pm 3.5$

*Their* 3.5 from use of

Alternative method 1:

**M3** for  $t^2 - 20t + 87.7$   
or

**M2** for  $144 + t^2 - 20t$   
156.25

or  
**M1** for  $12^2 + (t - 10)^2$

AND

**M1** for correct method  
*their* 3-term quadratic

### Question 5

$$y = \frac{1}{2}x - 2$$

|                                                                                          |    |
|------------------------------------------------------------------------------------------|----|
| (gradient =) 0.5 or $\frac{1}{2}$                                                        | M1 |
| 0 = <i>their</i> $0.5 \times 4 + c$ or $c = -2$<br>or $y - 0 = \text{their } 0.5(x - 4)$ | M1 |
| $y = 0.5x - 2$<br>or $y = 0.5(x - 4)$                                                    | A1 |

### Question 6

$$j = -2$$

$$k = 11$$

|                                                                                                                                                                                                                                                      |                                                                                                                              |   |                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gradient of $JK = -0.5$ or $m_1 \times m_2 = -1$<br>$\frac{k-15}{6-j} = -\frac{1}{2}$ or $2k-j = 24$ or $j = 2k-24$ or $k = \frac{j+24}{2}$ oe                                                                                                       |                                                                                                                              | 6 | M1 for finding the gradient of $JK$ using $m_1 \times m_2 = -1$<br>M1 for expressing the gradient of $JK$ in terms of $j$ and $k$ or a correct equivalent equation                                                                                                     |
| $(j-6)^2 + (k-15)^2 = 80$ oe<br>or<br>$\left(\frac{j+6}{2}, \frac{k+15}{2}\right)$ oe<br>or<br>$(j+4)^2 + 196 = 100 + (k-1)^2$ oe                                                                                                                    |                                                                                                                              |   | M1 for finding equation of $JK$ in terms of $j$ and $k$<br>or<br>for finding the midpoint of $M$<br>or<br>for equating length $HJ$ with length $HK$                                                                                                                    |
| eg $3k^2 - 78k + 495 = 0$ oe<br>or $5j^2 - 60j - 140 = 0$ oe<br>or $5k^2 - 150k + 1045 = 0$ oe<br>or $3j^2 - 12j - 36 = 0$ oe<br>or<br>gradient $HM$ : eg $\frac{\frac{k+15}{2}-1}{\frac{j+6}{2}+4} = 2$ or $k = 2j + 15$ or $j = \frac{k-15}{2}$ oe |                                                                                                                              |   | M1 (dep on M3) writing a correct quadratic expression in the form $ax^2 + bx + c (=0)$ (allow $ax^2 + bx = c$ )<br>or<br>A correct equation for the gradient of $HM$ in terms of $j$ and $k$ or a correct equivalent equation                                          |
| eg $(k-15)(k-11)(=0)$ or<br>$\frac{78 \pm \sqrt{(-78)^2 - 4 \times 3 \times 495}}{2 \times 3}$<br>or<br>$(k-13)^2 - 169 + 165(=0)$                                                                                                                   | eg $(j-6)(j+2)(=0)$ or<br>$\frac{12 \pm \sqrt{(-12)^2 - 4 \times 3 \times -36}}{2 \times 3}$<br>or<br>$(j-2)^2 - 4 - 12(=0)$ |   | M1 (dep on M3) for a complete method to solve their 3-term quadratic equation (allow one sign error in the use of the quadratic formula)<br>or<br>a correct method to eliminate either $j$ or $k$<br>eg $2k - 24 = \frac{k-15}{2}$ oe or $\frac{j+24}{2} = 2j + 15$ oe |
| $j = -2, k = 11$                                                                                                                                                                                                                                     |                                                                                                                              |   | A1                                                                                                                                                                                                                                                                     |

|                                                                                                                                             |                                                                                                                                                  |   |                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------|
| $\left(\frac{j+6}{2}, \frac{k+15}{2}\right)$ oe                                                                                             |                                                                                                                                                  | 6 | M1 for finding the midpoint of $M$                                                                                                       |
| $\frac{\frac{k+15}{2}-1}{\frac{j+6}{2}+4} = 2$ or $k - 2j = 15$ or $k = 2j + 15$ or<br>$j = \frac{k-15}{2}$ oe                              |                                                                                                                                                  |   | M1 for expressing the gradient of $JK$ in terms of $j$ and $k$ or a correct equivalent equation                                          |
| $(j-6)^2 + (k-15)^2 = 80$ oe<br>or $(j+4)^2 + 196 = 100 + (k-1)^2$ oe                                                                       |                                                                                                                                                  |   | M1 for finding the length of $JK$ in terms of $j$ and $k$<br>or for equating length $HJ$ with length $HK$                                |
| E.g.<br>$5j^2 - 12j - 44 = 0$<br>or<br>$3j^2 + 48j + 84 = 0$ oe                                                                             | E.g.<br>$5k^2 - 174k + 1309 = 0$<br>or<br>$3k^2 + 6k - 429 = 0$ oe                                                                               |   | M1 (dep on M3) writing the correct quadratic expression in form $ax^2 + bx + c (=0)$<br>allow $ax^2 + bx = c$                            |
| E.g.<br>$(5j - 22)(j + 2)(=0)$<br>or<br>$\frac{12 \pm \sqrt{(-12)^2 - 4 \times 3 \times -44}}{2 \times 3}$<br>or<br>$(j+8)^2 - 64 + 28(=0)$ | E.g.<br>$(5k - 119)(k - 11)(=0)$<br>or<br>$\frac{174 \pm \sqrt{(-174)^2 - 4 \times 3 \times 1309}}{2 \times 3}$<br>or<br>$(k+1)^2 - 1 - 143(=0)$ |   | M1 (dep on M3) for a complete method to solve their 3-term quadratic equation (allow one sign error in the use of the quadratic formula) |
| $j = -2, k = 11$                                                                                                                            |                                                                                                                                                  |   | A1                                                                                                                                       |