Answer **all** the questions.

1. List the following numbers in descending order, starting with the largest.

1.8^2 π $\sqrt[3]{42}$ 3.14

$\sqrt[3]{42}$ 1.8^2 π 3.14	------ B1 for 2 correct positions ------B2 for all correct

Answer ……, ……. , ……, ……. [2]
(largest) (smallest)

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2. **(a)** Solve the inequality $4y > -38$.

$4y > -38$ $y > -9.5$	------ B1

Answer …… [1]

(b) Find the smallest integer satisfying $4y > -38$.

-9	------ B1

Answer …… [1]

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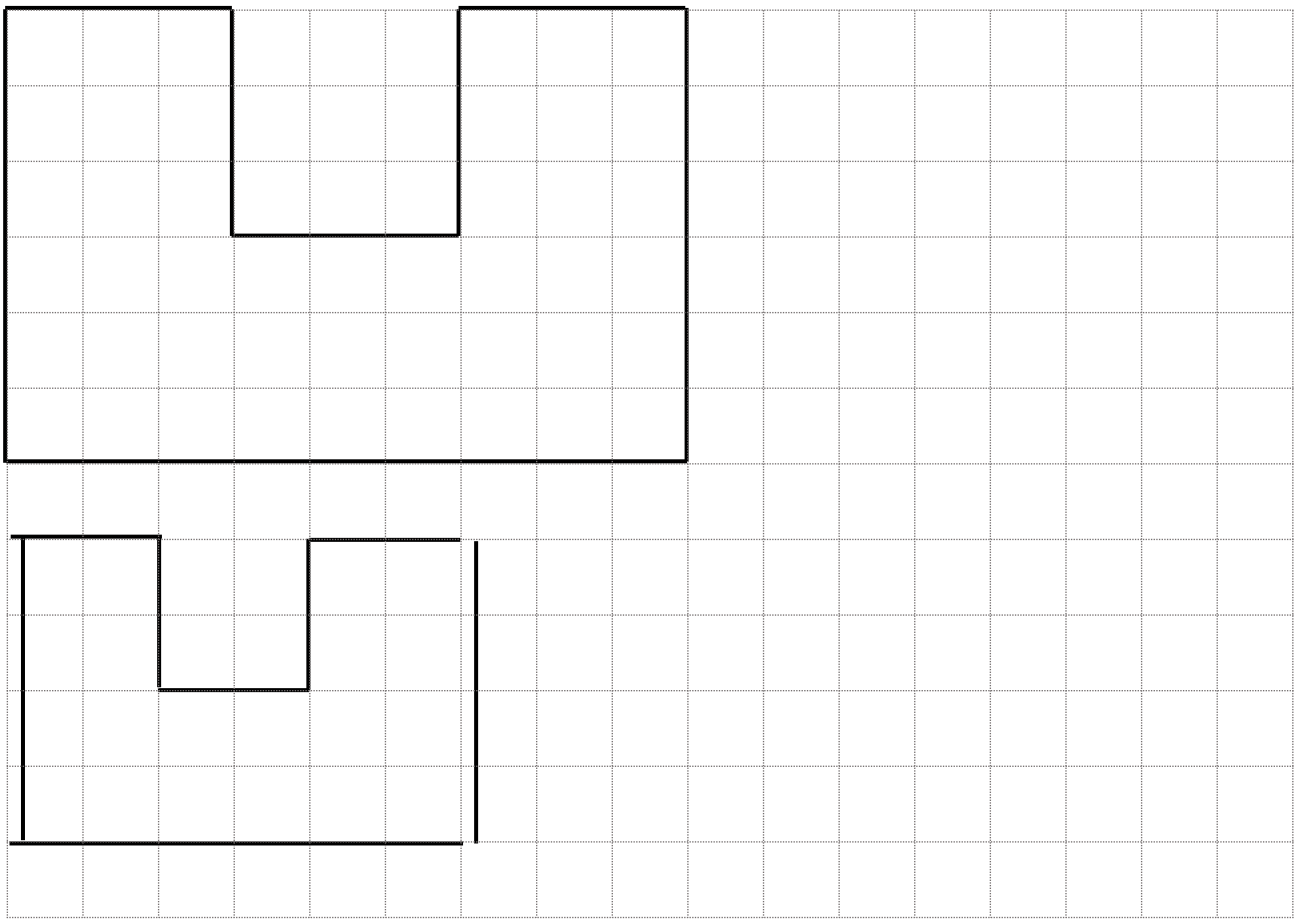
3. Factorise $3xy - py + 6xq - 2pq$ completely.

$3xy - py + 6xq - 2pq$ $= y(3x - p) + 2q(3x - p)$ $= (y + 2q)(3x - p)$	------ M1 (first line factorisation) ------ A1

Answer …… [2]

4. Draw a reduction of the figure using a scale factor of $\frac{2}{3}$.

Answer



---------- *B2/1/0* [2]

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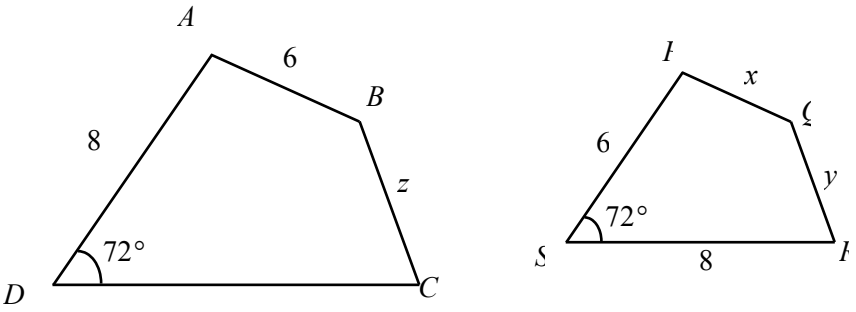
5. Solve $3(1-x)=15$.

$3(1-x)=15$ $3-3x=15$ $-3x=15-3$ $-3x=12$ $x=-4$	------ M1 (expand) ------ A1 / B1	$3(1-x)=15$ $1-x=\frac{15}{3}$ $1-x=5$ $x=-4$	------ M1 (÷3) ------ A1 / B1

Answer $x=$ ……..…… [2]

6.



Quadrilaterals *ABCD* and *PQRS* are similar.

All the lengths are in centimetres.

(a) Calculate x.

Since figures are similar: $\frac{x}{6} = \frac{6}{8}$ $8x = 36$ $x = 4.5cm$	------ M1 (O.E) ------ A1 / B2

Answer $x =$ ……[2]

(b) Find y in terms of z.

$\frac{y}{z} = \frac{6}{8}$ $y = \frac{3z}{4}$	------ B1

Answer $y =$ ……[1]

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7. 2, 9, 16, 23, 30, …

(a) Write down the next 2 terms in the sequence.

37 , 44	----- B1

Answer ……, ……[1]

(b) Find an algebraic expression for the nth term in the sequence.

$7n - 5$	----- B2

Answer ……[2]

(c) Find the 154th term of this sequence.

$7(154) - 5 = 1073$	----- B1

Answer ……[1]

8. It is given that y is inversely proportional to the square of x.
When $x = 6$, $y = 4$.

Find the value(s) of x when $y = 100$.

$y = \frac{k}{x^2}$ (where k is a constant) $4 = \frac{k}{6^2}$ $4 \times 36 = k$ $k = 144$ $y = \frac{144}{x^2}$	----- M1 (finding k correctly to inverse proportion)
when $y = 100$, $100 = \frac{144}{x^2}$ $x^2 = \frac{144}{100}$ $x^2 = 1.44$ $x = \pm\sqrt{1.44}$ $x = \pm 1.2$	----- M1 (Substituting 100 correctly 'their' equation) ----- A1

Answer $x =$ ..... [3]

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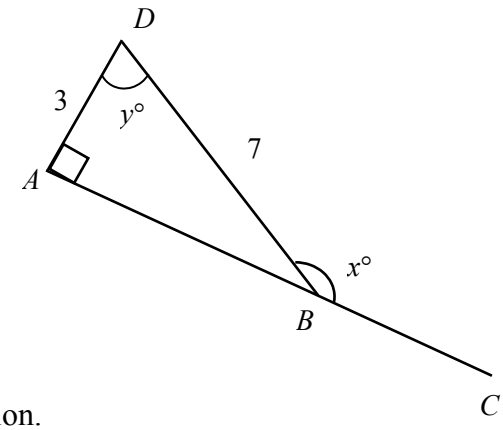
9. In the diagram, ABC is straight line, angle $BAD = 90°$, $AD = 3$ cm and $BD = 7$ cm.



(a) Write $\sin x°$ as a fraction.

$\sin x = \sin(180 - x)$ $= \frac{3}{7}$	----- B1

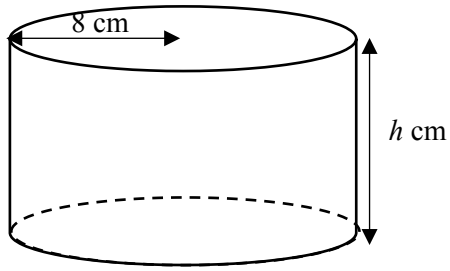
Answer ..... [1]

(b) Find y.

$\cos y = \frac{3}{7}$ $y = \cos^{-1}\left(\frac{3}{7}\right) = 64.6°$	----- M1 (O.E, students may use sin ratio to find other angle first before using angle sum of triangle to find y) ----- A1

Answer ..... [2]

10. A solid cylinder has radius 8 cm and height h cm.



Given that the total surface area of the cylinder is 650 cm^2, calculate h.

Total surface area of cylinder = $2\pi r^2 + 2\pi rh$ $2\pi(8)^2 + 2\pi(8)h = 650$ $128\pi + 16\pi h = 650$ $16\pi h = 650 - 128\pi$ $h = \dfrac{650 - 128\pi}{16\pi}$ $h = \dfrac{650 - 128\pi}{16\pi}$ $= 4.93133$ $= 4.93$ cm (3 sf)	----- M1 (correct application of formula) ----- M1 (isolating h correctly) ----- A1

Answer $h =$ ……..…… cm [3]

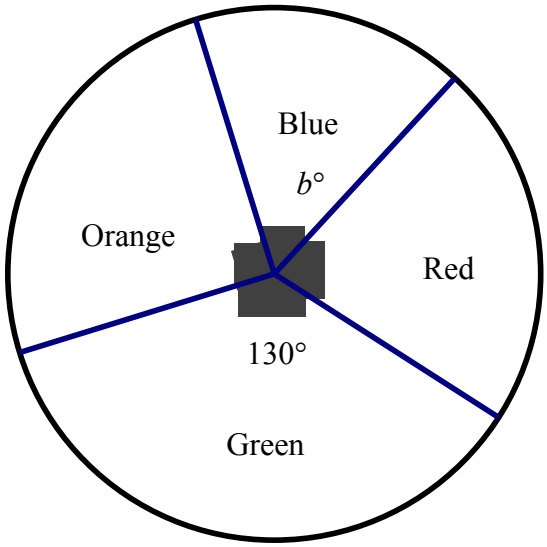
---

11. Simplify $\dfrac{3}{x-5} + \dfrac{x}{x^2-25}$.

$\dfrac{3}{x-5} + \dfrac{x}{x^2-25} = \dfrac{3}{x-5} + \dfrac{x}{(x+5)(x-5)}$ $= \dfrac{3(x+5)}{(x-5)(x+5)} + \dfrac{x}{(x+5)(x-5)}$ $= \dfrac{3x+15+x}{(x+5)(x-5)}$ $= \dfrac{4x+15}{(x+5)(x-5)}$	----- M1 (factorization) ----- M1 (making single fraction) ----- A1

Answer …… [3]

12.



The diagram (not drawn to scale) shows a circle divided into sectors of different colours.

Given than $\frac{2}{9}$ of the circle is red, find b.

Red $= \frac{2}{9} \times 360°$ $= 80°$ $b = 360° - 80° - 130° - 90°$ $= 60°$	-- M1 -- M1 -- A1	$\frac{130}{360} + \frac{90}{360} + \frac{2}{9} = \frac{5}{6}$ $1 - \frac{5}{6} = \frac{1}{6}$ $\frac{1}{6} \times 360° = 60°$	----- M1 ----- M1 ----- A1

Answer $b =$ …… [3]

---

13. The equation of a straight line is $3y = 12 - 2x$.

Find the coordinates of the point where the line cuts the y–axis.

$3y = 12 - 2x$ Let $x = 0$, $3y = 12 - 0$ $y = 4$ (0 , 4)	----- M1 (accept rearranging to make y the subject to find c) ----- A1 / B2

Answer (…… , ……..) [2]

14. Jenny travelled from Singapore to Thailand.

She exchanged 800 dollars ($) into Thai Baht (THB) when the exchange rate is $1 = 25 THB.
While in Thailand, she spent 10 800 THB.

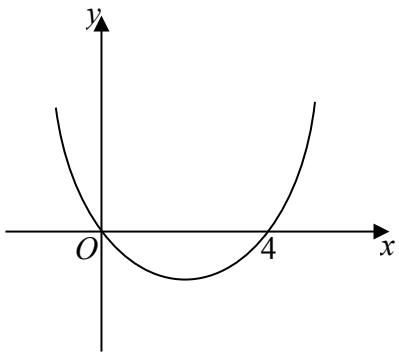
On her return, she exchanged the remaining Thai Baht into dollars when the exchange rate was $1 = 24 THB.

How many dollars ($) did she receive?
Leave your answer correct to the nearest dollar.

$1 = 25 THB $800 → 800 × 25 = 20 000 THB Balance = 20 000 – 10 800 = 9200 THB $1 = 24 THB 9200 THB → $\frac{9200}{24}$ = $383.33 = $383 (nearest dollar)	----- M1 ----- M1 (using *their* balance) ----- A1

Answer $ ..... [3]

15.



(a) Which one of the following is a possible equation for the graph?

$y = 4x - 16$ $y = x(4 - x)$ $y = x(x - 4)$ $y = x^2$

$y = x(x - 4)$ ----- B1

Answer ..... [1]

(b) Write down the equation of line of symmetry.

$x = \frac{0+4}{2}$ $x = 2$	----- B1

Answer ……..…… [1]

16. (a) Rearrange this equation to make a the subject of the formula.

$$\frac{3a+c}{d}=2$$

$\frac{3a+c}{d}=2$ $3a+c=2d$ $3a=2d-c$ $a=\frac{2d-c}{3}$	----- M1 ----- A1

Answer $a=$ ……..…… [2]

(b) Hence or otherwise, find the value of a if $c=-5$ and $d=8$.

$a=\frac{2(8)-(-5)}{3}$ $=7$	----- M1 ----- A1

Answer $a=$ ……..…… [2]

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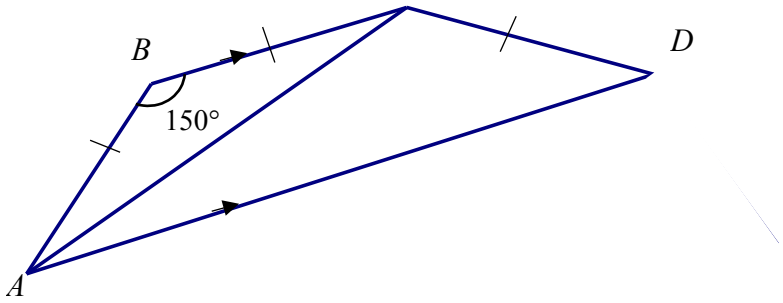
17. The diagram below shows a trapezium, where $AB = BC = CD$, BC is parallel to AD and angle $ABC = 150°$.



(a) Find angle ACD.

angle $BCA = \frac{180 - 150}{2}$ (base angle isosceles triangle) $= 15°$ angle $ACD = 150° - 15°$ $= 135°$	----- M1 ----- A1

Answer ……° [2]

(b) Explain why AC bisects angle BAD. Show working and/or reasons clearly.

Answer

angle $CAD = 15°$ (alternate angles) $= 15°$ angle $BAC = 15°$ (base angle isosceles triangle) Since angle CAD = angle BAC, AC bisects angle BAD,	----- M1 (with reason) ----- M1 (with reason) (give 1m for 15° if both reasons not given) ----- A1 (conclusion)

[3]

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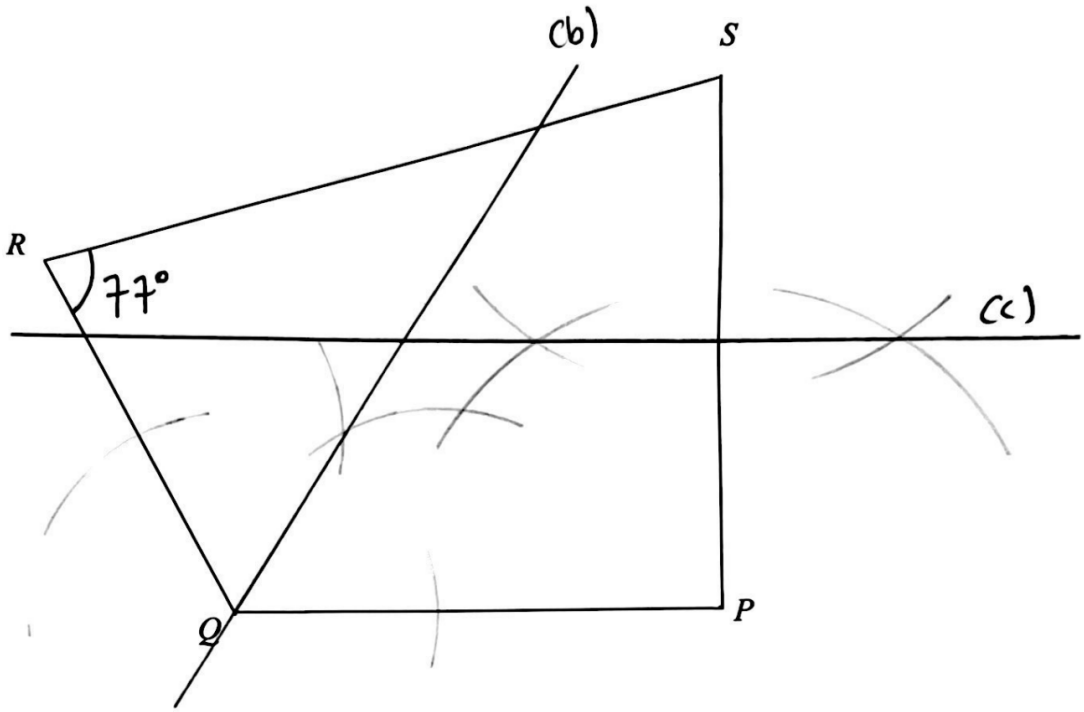
18. The diagram below shows the layout of a garden.



(a) Measure angle *QRS*. 77° ----- B1 (+/- 1)

Answer angle *QRS* = ……° [1]

(b) Construct the angle bisector of angle *RQP*. ----- B1 [1]

(c) Construct the perpendicular bisector of *PS*. ----- B1 [1]

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19. $(x+1)^2-11$ can be expressed in the form x^2+bx+c.

(a) Find the value of b and c.

$(x+1)^2-11 = x^2+2x+1-11$ $= x^2+2x-10$ $b=2$, $c=-10$	----- M1 ----- A1 (or B2)

Answer $b =$ ..... , $c =$ ..... [2]

(b) Solve the equation $(x+1)^2-11=0$, leaving your answers correct to two decimal places.

$(x+1)^2-11=0$ $(x+1)^2=11$ $x+1=\sqrt{11}$ *or* $x+1=-\sqrt{11}$ $x=\sqrt{11}-1$ *or* $x=-\sqrt{11}-1$ $x=2.32$ *or* $x=-4.32$	 ----- M1 ----- A1 (both correct)

Answer $x =$ ..... or $x =$ ..... [2]

---

20. (a) Jae invested \$4500 at 2.5% compound interest per annum, compounded annually.

Calculate the compound interest Jae will receive at the end of 5 years?
Give your answer correct to the nearest cent.

$A=P\left(1+\frac{r}{100}\right)^n$ $A=\$4500\left(1+\frac{2.5}{100}\right)^5$ $=\$5091.34$ Interest = \$5091.34 – \$4500 = \$591.34	 ----- M1 ----- M1 (their A – P) ---- A1

Answer \$ ..... [3]

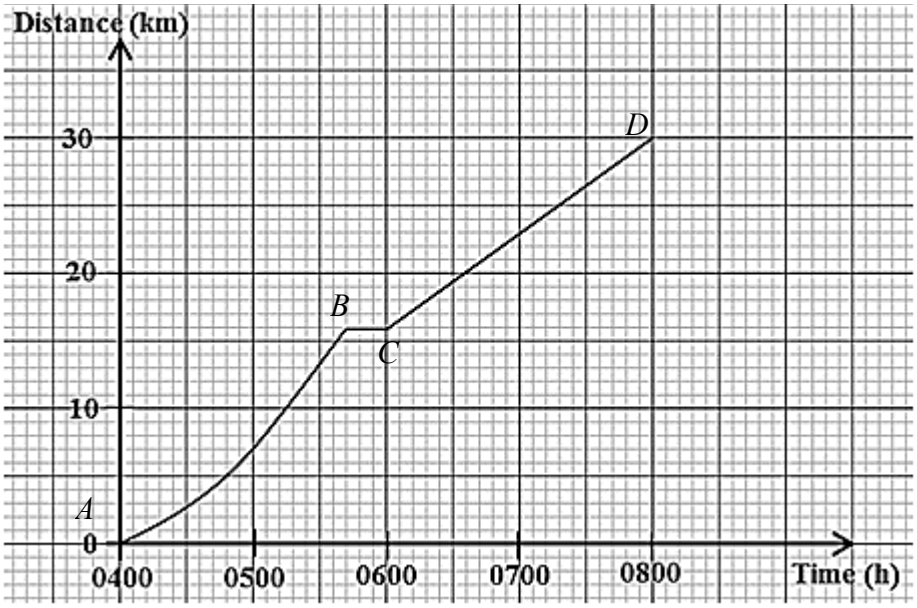
(b) Gina invested some money in government bonds.
One year later her investment had gained 8.5% of its original value.
It was then worth \$8029.

How much did Gina invest originally?

$\frac{\$8029}{108.5}\times 100$ $=\$7400$	----- M1 ---- A1

Answer \$ ..... [2]

21. George participated in a 30 km marathon.
The distance-time graph below represents his run from the start to finish.



(a) What does the line *BC* represent?

George is at rest / not moving ------ B1 (O.E)

Answer ……..…. [1]

(b) How long did it take for George to reach point B?

1 h 42 min --------- B1

Answer ……. h …… min [1]

(c) 'George's average running speed from *A* to *B* is faster than his average running speed from *C* to *D*.'
Is this statement correct? Explain your answer.

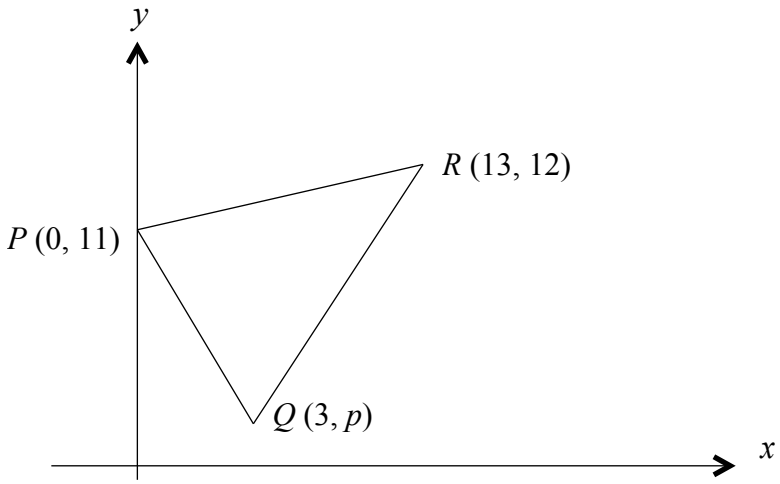
Answer

AB Speed = $\frac{16 \div 1\frac{7}{10}}{} = 9.4117$ km/h CD speed = $14 \div 2 = 7$ km/h The statement is correct because speed AB is faster than speed CD. <u>*Alternatively*</u>: From A to B, George covers 16 km in less than 2 hours. Whereas from C to D, George covers 14 km in 2 hours, covering less distance in longer time. Hence, the statement is correct,	----- M1 (either correct speed) ---- A1 M1 (compare distance with time covered) A1

[2]

22. The diagram below, which is not drawn to scale, shows a triangle PQR.

The coordinates of P, Q and R are (0, 11), (3, p) and (13, 12) respectively.



(a) Find the length of PR, leaving your answer correct to 2 decimal places.

Length PR $= \sqrt{(12-1)^2+(13+0)^2}$ $= 13.0384$ $= 13.04$ units	----- M1 ---- A1

Answer ..... [2]

(b) Given that the gradient of RQ is 1, find the value of p.

$\frac{12-p}{13-3} = 1$ $12-p=10$ $p=2$	----- M1 ---- A1 / B2

Answer ..... [2]

(c) Find the equation of RQ.

$y=mx+c$ Equation PQ , using (3, 2): $2=3+c$ $c=-1$ Answer : $y=x-1$	 ----- M1 ---- A1

Answer ..... [2]

END OF PAPER