

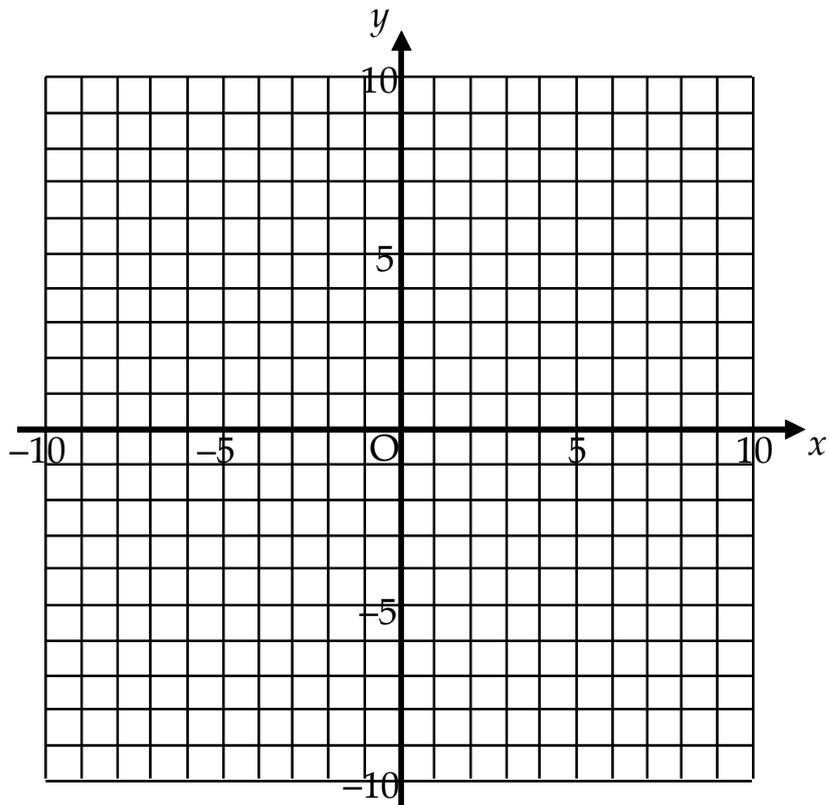
NATIONAL 4 – RELATIONSHIPS (v2)

Answer these questions, showing all working.

1. (a) Complete the table for $y = 3x - 2$.

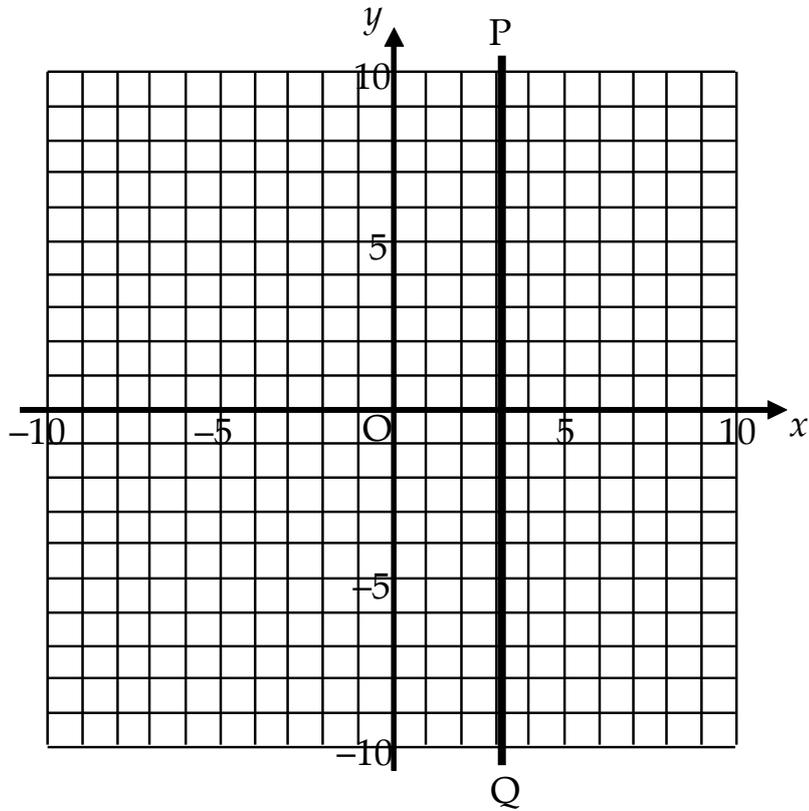
x	1	2	3
y			

- (b) Draw the line $y = 3x - 2$.



2. Line PQ is shown on the grid below.

Write down the equation of line PQ.



3. Solve the following equation:

$$5x + 18 = 3$$

4. The cost, £ C , of filling a tank with petrol is given by the formula $C = NP$ where N is the number of litres and £ P is the cost per litre.

(a) Change the subject of the formula to N .

(b) Julia has £50 in her purse when she goes to buy petrol for her car. The petrol costs £1.34 per litre. How many litres of petrol can she buy?

5. Change the subject of this formula to q :

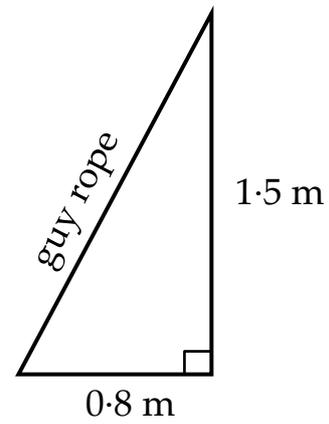
$$p = 7q - 2$$

6. A guy rope runs from the top of a tent pole to the ground.

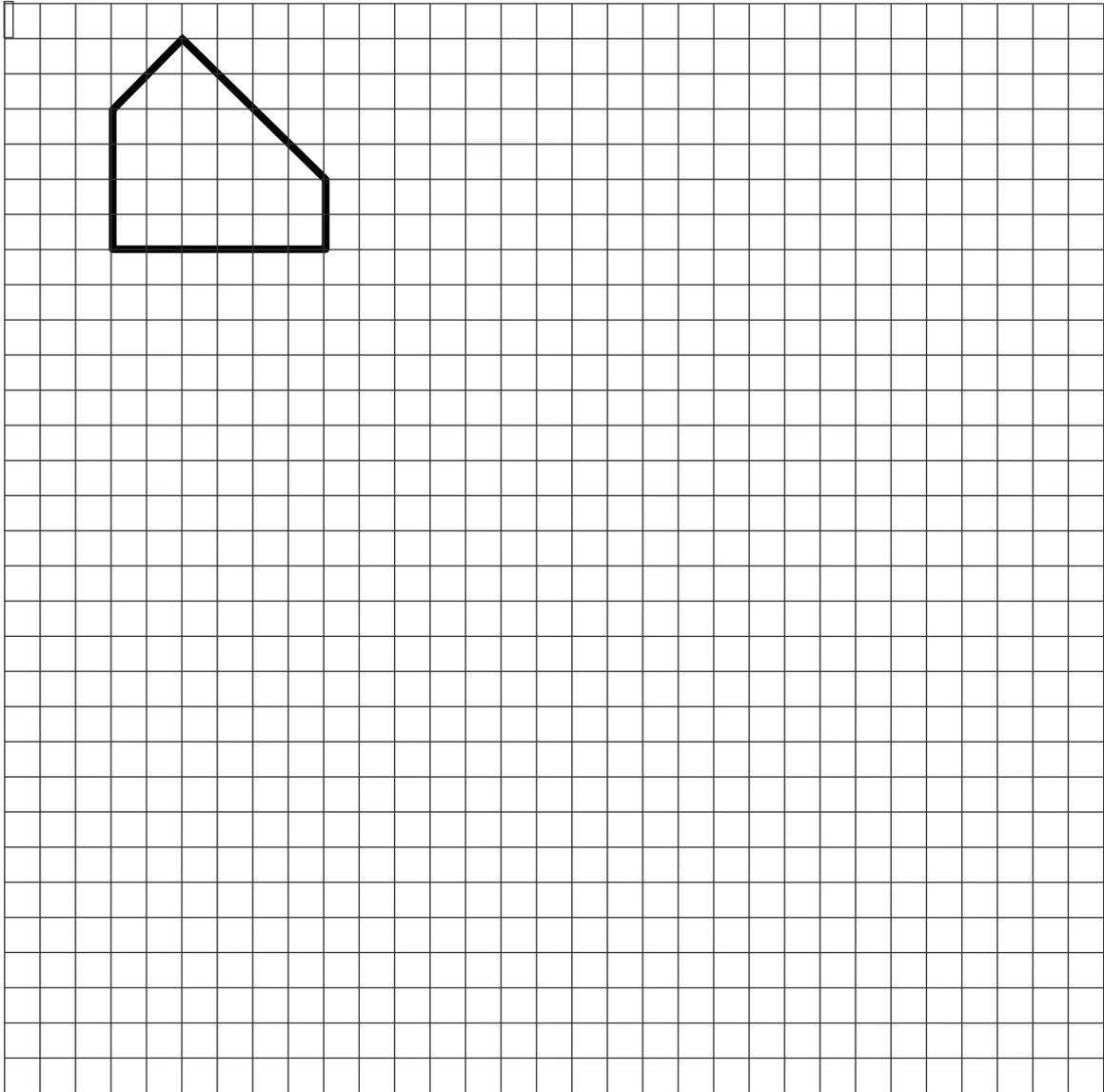


The tent pole is 1.5 metres high and the bottom of the guy rope is 0.8 metres from the base of the tent pole.

Calculate the length of the guy rope.



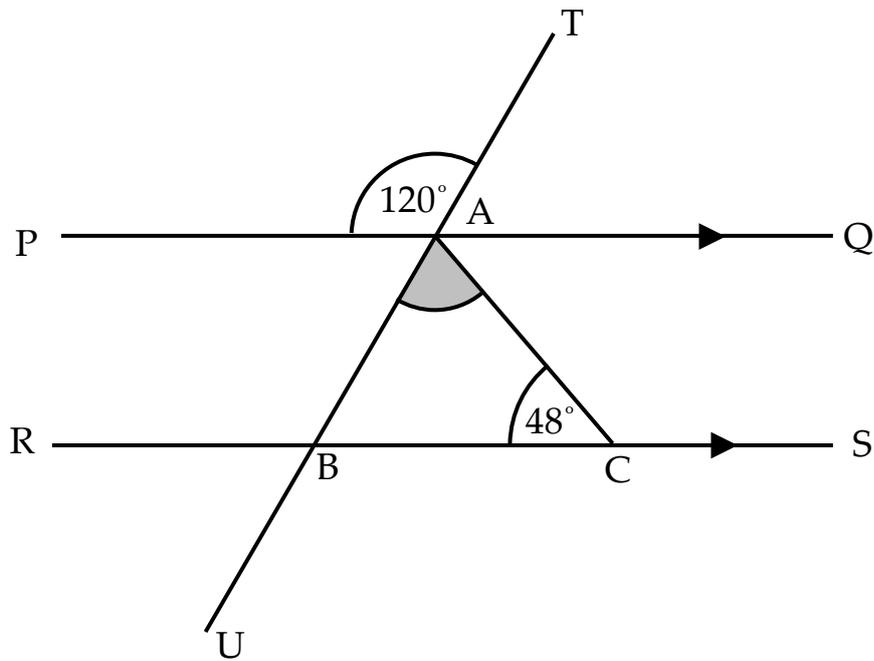
7. On the diagram below, draw an enlargement of the given shape using a scale factor of $\frac{5}{2}$.



8. In the diagram below, lines PQ and RS are parallel.

Line TU intersects PQ and RS at the points A and B.

Angle TAP is 120° and angle ACB is 48° .

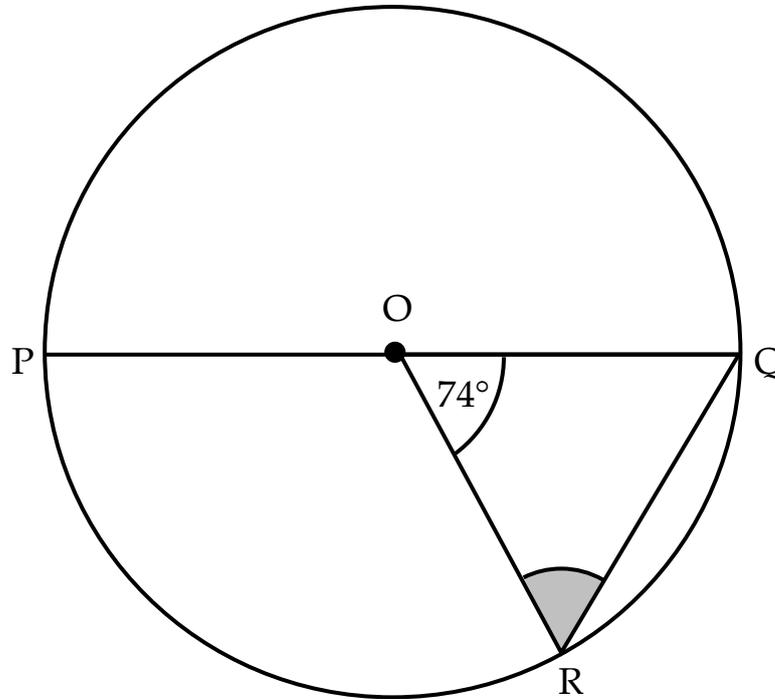


Calculate the size of the shaded angle BAC.

9. PQ is the diameter of a circle, centre O.

R is a point on the circumference of the circle.

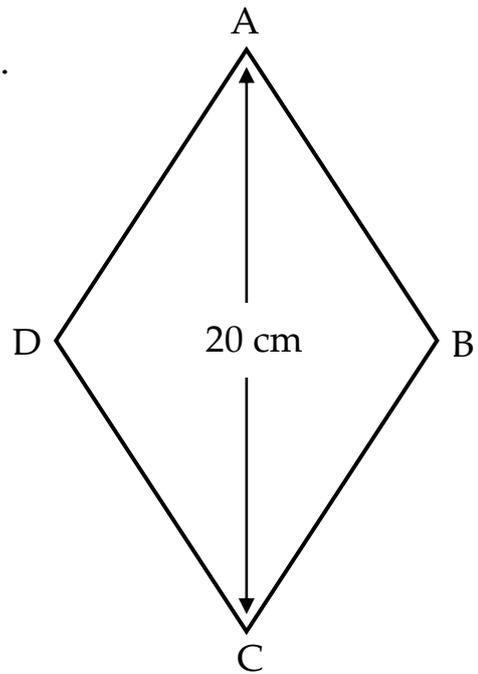
Angle ROQ is 74° .



Calculate the size of the shaded angle ORQ.

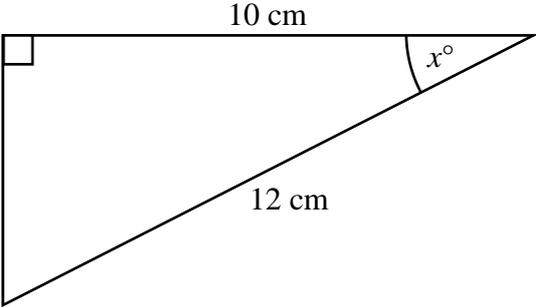
10. The diagram shows rhombus ABCD.

The perimeter of the rhombus is 48 centimetres and the distance from A to C is 20 centimetres.



Calculate the distance from B to D.

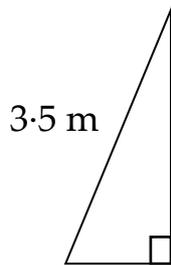
11. Calculate the size of angle x° in the right-angled triangle below.



12. For safety reasons, a ladder manufacturer states that the maximum angle between a ladder and the ground is 75° .

A ladder is placed against the side of a house.
The ladder is 3.5 metres long.

- (a) What is the maximum height the ladder can safely reach?

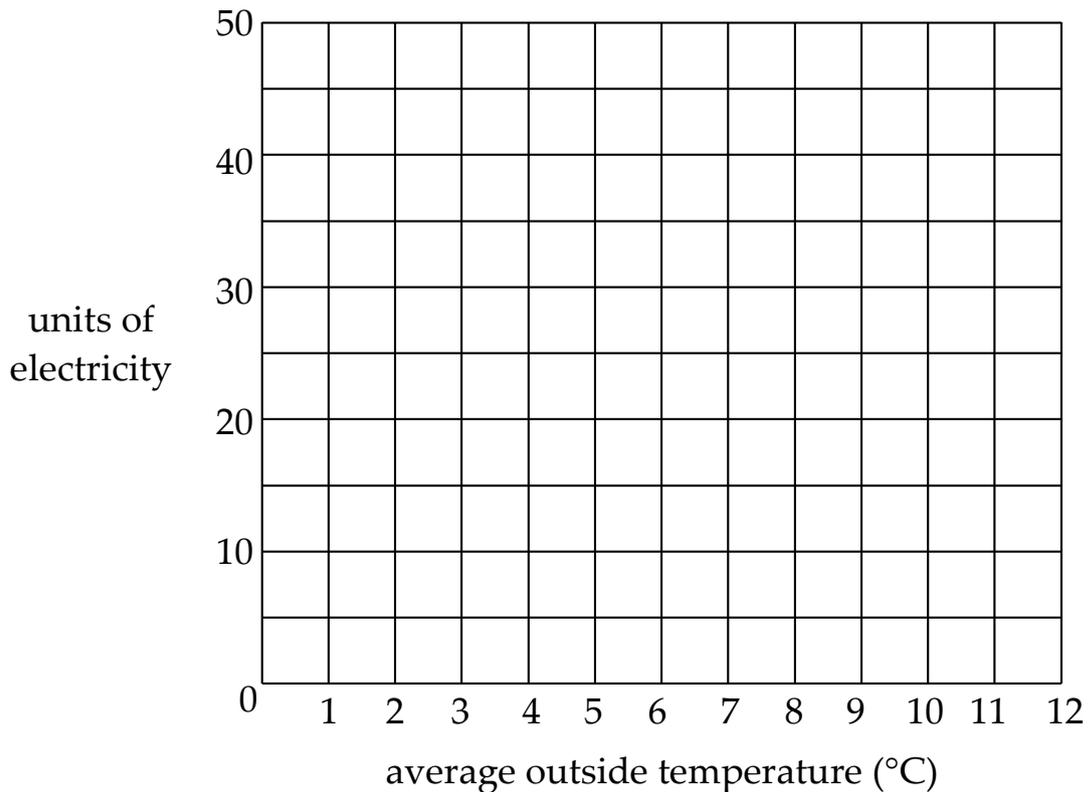


- (b) The ladder has to reach a window ledge that is 3.2 metres from the ground. Is this safe, according to the manufacturer's statement?

13. The table shows the number of units of electricity used in heating a house on eight different days and the average outside temperature for each day.

Average temperature ($^{\circ}\text{C}$)	6	2	0	3	5	11	8	9
Units of electricity used	28	38	41	31	31	10	25	23

- (a) Draw a scatter graph for this information on the grid below.



- (b) Draw a best fitting straight line for this scattergraph.

Question	Main points of expected response	
9	<ul style="list-style-type: none"> •¹ use sum of angles in a triangle •² know triangle OQR is isosceles 	<ul style="list-style-type: none"> •¹ $180^\circ - 74^\circ$ •² $106^\circ \div 2 = 53^\circ$
10	#2.1 use valid strategy <ul style="list-style-type: none"> •¹ correct answer 	<ul style="list-style-type: none"> •¹ find length of side of rhombus and apply Pythagoras's Theorem •² 13.3 cm
11	<ul style="list-style-type: none"> •¹ use cosine ratio correctly •² find size of angle 	<ul style="list-style-type: none"> •¹ $\cos x^\circ = \frac{10}{12}$ •² $x^\circ = 33.56^\circ$ (do not penalise rounding)
12 (a)	<ul style="list-style-type: none"> •¹ use sine ratio correctly •² rearrange formula •³ calculate height 	<ul style="list-style-type: none"> •¹ $\sin 75^\circ = \frac{x}{3.5}$ •² $x = 3.5 \sin 75^\circ$ (stated, or implied by •³) •³ 3.38 m (do not penalise rounding)
(b)	#2.2 valid conclusion with reason	#2.2 It is safe as $3.2 < 3.38$
13 (a)	<ul style="list-style-type: none"> •¹ four points correct on graph •² all points correct on graph 	<ul style="list-style-type: none"> •¹ any four points correctly plotted •²
(b)	• ³ valid line of best fit drawn	• ³ valid line of best fit drawn

Questions	Assessment Standards											
	1.1		1.2		1.3		1.4		2.1		2.2	
	Points available	Points gained	Points available	Points gained	Points available	Points gained	Points available	Points gained	Points available	Points gained	Points available	Points gained
1	3											
2	1											
3	2											
4	1										#1	
5	2											
6			3									
7			2									
8			1						#1			
9			2									
10			1						#1			
11					2							
12 (a)					3							
12 (b)											#1	
13 (a)							2					
13 (b)							1					
Required to meet the relevant Assessment Standard	At least 5/9		At least 5/9		At least 3/5		At least 2/3		At least 1/2		At least 1/2	
Assessment Standard met (✓)												