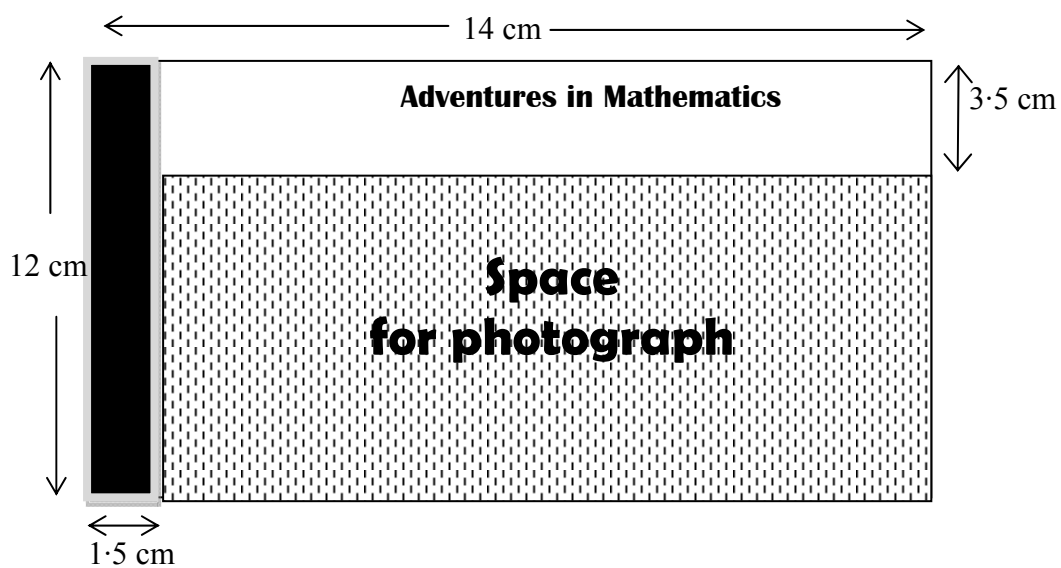


Question 1

A designer is making a DVD cover as shown below (diagram not to scale). He has left a space for a photograph. Find the area of the space for the photograph.



$$14 - 1.5 = 12.5$$

$$12 - 3.5 = 8.5$$

$$12.5 \times 8.5$$

$$= 106.25 \text{ cm}^2$$

or

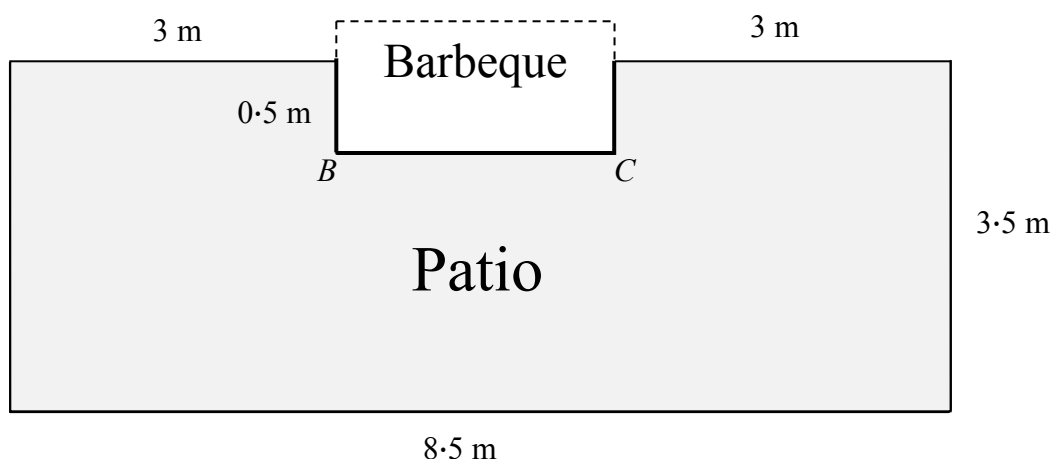
$$12 \times 14 - [12.5 \times 3.5 + 12 \times 1.5]$$

$$= 168 - [43.75 + 18]$$

$$= 106.25 \text{ cm}^2$$

Question 2

A gardener wants to build a patio in her garden and a space for a barbeque. Below is a plan of the patio and barbeque she wants to build.



- (a) Find the length of $[BC]$.

$$\begin{aligned} 8.5 - 3 - 3 \\ = 2.5 \text{ m} \end{aligned}$$

- (b) Find the perimeter of the patio.

$$\begin{aligned} 3 + 0.5 + 2.5 + 0.5 + 3 + 3.5 + 8.5 + 3.5 \\ = 25 \text{ m} \end{aligned}$$

- (c) The owner wants to cover the patio with slabs. Find the area to be covered.

$$\begin{aligned} 8.5 \times 3.5 - 2.5 \times 0.5 \\ = 29.75 - 1.25 \\ = 28.5 \text{ m}^2 \end{aligned}$$

- (d) The slabs are squares of side 0.5 m. Find the number of slabs required.

$$\begin{aligned} 0.5 \times 0.5 \\ = 0.25 \\ \hline 28.5 \\ 0.25 \\ \hline = 114 \end{aligned}$$

- (e) She has €500 to spend on slabs. The slabs cost €4.50 each. Does she have enough money to cover the entire patio? Explain your answer.

| | |
|--------------|--|
| Answer: | No. |
| Explanation: | She would need €513 to get all the slabs. |

Question 3

(suggested maximum time: 10 minutes)

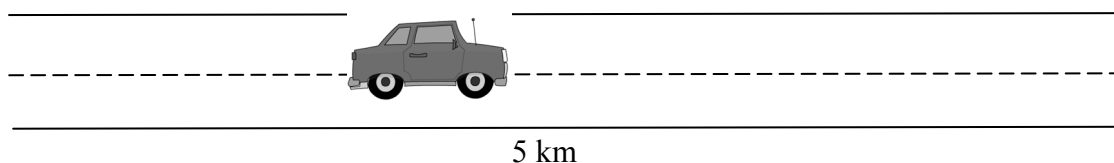
- (a) Caoimhe travelled by car from Athlone to Sligo. She left Athlone at 8:45 a.m. and arrived in Sligo at 10:30 a.m. How long did it take Caoimhe to travel from Athlone to Sligo? Give your answer in hours and minutes.

| |
|------------------------------|
| 1 hour and 45 minutes |
|------------------------------|

- (b) The distance from Athlone to Sligo is 112 km. Find Caoimhe's average speed, in km per hour.

| |
|---|
| $\frac{112}{1 \text{ hr } 45 \text{ mins}} = \frac{112}{1.75} = 64 \text{ km/hr}$ |
|---|

- (c) Caoimhe travels a certain 5 km stretch of road in 4 minutes at a constant speed. Find how far she travels in one minute, on this stretch.



| |
|---|
| $\frac{5 \text{ km}}{4 \text{ mins}} = 1.25 \text{ km/min}$ |
|---|

- (d) Find her speed for this stretch of road in km/h.

$$1.25 \times 60 \\ = 75 \text{ km/h}$$

- (e) The speed limit for this stretch of road is 80 km/h. From your answer in part (d) above, was Caoimhe driving over the speed limit? Give a reason for your answer.

Answer:

No

Reason:

75 km/h is within the speed limit.



Question 4

- (a) Let A be the set of months of the year. List the elements of A .

{Jan, Feb, March, April, May, June, July, August, Sept, Oct, Nov, Dec}

- (b) What is the probability that a month chosen at random from set A begins with the letter J?

$P(J) =$

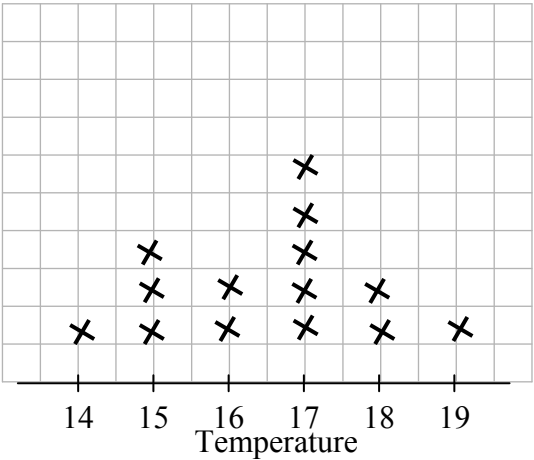
$\frac{1}{4}$

Question 5

Karen went on holidays for two weeks in August 2011. Below is a record of the daily temperatures for the two weeks in August 2011.

| Day | Temperature |
|----------------------------|-------------|
| Monday 15 th | 17° |
| Tuesday 16 th | 18° |
| Wednesday 17 th | 16° |
| Thursday 18 th | 17° |
| Friday 19 th | 16° |
| Saturday 20 th | 18° |
| Sunday 21 st | 17° |
| Monday 22 nd | 19° |
| Tuesday 23 rd | 17° |
| Wednesday 24 th | 15° |
| Thursday 25 th | 15° |
| Friday 26 th | 15° |
| Saturday 27 th | 14° |
| Sunday 28 th | 17° |

- (a) What was the temperature on Thursday 18th of August? 17°
- (b) Use a line plot to show the number of times each temperature was recorded.



- (c) What is the range of the data? 5

- (d) What is the mode of the data? 17°
- (e) Karen says that “on average it was warmer during the first week than the second week of my holiday”. Do you agree with Karen? Explain your answer.

| | |
|--------------|---|
| Answer: | Yes. |
| Explanation: | The average for the first week was 17 degrees but the average for the second week was only 16 degrees. |

Question 6

There are 22 players on the Irish rugby squad for a game. Their heights (in centimetres) are given below.

180, 188, 185, 180, 183, 177, 180, 183, 198, 191, 191,
185, 185, 180, 185, 196, 180, 188, 180, 183, 191, 193

- (a) What is the height of the tallest player? 198 cm
- (b) How many of the players are over 184 cm in height? 12
- (c) What percentage of the players are below 181 cm in height? Give your answer correct to the nearest whole number.

$$\frac{7}{22} \times \frac{100}{1} = 31.8181..... = 32 \%$$

The arm spans (in centimetres) of the same players in the same order are given below.

180, 184, 188, 178, 182, 176, 180, 185, 201, 190, 189,
185, 186, 182, 182, 196, 181, 189, 178, 184, 190, 193

- (d) Find the median arm span.

| |
|--|
| 176,178,178,180,180,181,182,182,182,184, <u>184,185</u> ,185,186,188,189,189,190,190,193,196,201 |
|--|

$$\frac{184+185}{2} = 184.5 \text{ cm.}$$

- (e) Complete the table below to show the height and arm span of the tallest and shortest player in the squad.

| Player | Height | Armspan |
|---------------|--------|---------|
| Tallest (cm) | 198 | 201 |
| Shortest (cm) | 177 | 176 |

- (f) Write the ratio of height to arm span for (i) the tallest player and (ii) the shortest player in part (e).

| | |
|-----------|---|
| Tallest: | <div style="border: 1px solid black; padding: 10px; display: inline-block;">198:201</div> |
| Shortest: | <div style="border: 1px solid black; padding: 10px; display: inline-block;">177:176</div> |

- (g) Write each ratio in (f) above as a decimal. Give your answer correct to two decimal places.

| | |
|-----------|--|
| Tallest: | <div style="border: 1px solid black; padding: 10px; display: inline-block;">0.99</div> |
| Shortest: | <div style="border: 1px solid black; padding: 10px; display: inline-block;">1.01</div> |

- (h) The coach is 170 cm tall. What would you expect his arm span to be? Give a reason for your answer.

| | |
|---------|---|
| Answer: | <div style="border: 1px solid black; padding: 10px; display: inline-block;">170 cm.</div> |
| Reason: | <div style="border: 1px solid black; padding: 10px; display: inline-block;">The ratio is almost 1:1</div> |

Question 7

In a survey, 1500 people were asked which national radio station they normally listen to. The results of the survey are given in the table below.

| | RTE1 | Today FM | Newstalk | Lyric FM | 2FM | No national station |
|---------------------------------------|--------------------|--------------------|--------------------|-------------------|--------------------|---------------------|
| Frequency | 375 | 195 | 120 | 45 | 165 | 600 |
| Relative frequency (as a fraction) | $\frac{375}{1500}$ | $\frac{195}{1500}$ | $\frac{120}{1500}$ | $\frac{45}{1500}$ | $\frac{165}{1500}$ | $\frac{600}{1500}$ |
| Relative frequency (as a decimal) | 0.25 | 0.13 | 0.08 | 0.03 | 0.11 | 0.4 |

- (a) How many of the people surveyed do not listen to a national radio station?

$$375 + 195 + 120 + 45 + 165 = 900$$

$$1500 - 900 = 600$$

- (b) Complete the table above.

- (c) Find the sum of the relative frequencies written as fractions.

$$\frac{375}{1500} + \frac{195}{1500} + \frac{120}{1500} + \frac{45}{1500} + \frac{165}{1500} + \frac{600}{1500} = \frac{1500}{1500} = 1$$

- (d) Find the sum of the relative frequencies written as decimals.

$$0.25 + 0.13 + 0.08 + 0.11 + 0.40 = 1.00$$

- (e) Jackie wrote the relative frequencies as percentages. She found their sum to be 80%. Do you think her calculations are correct? Give a reason for your answer.

Answer:

No.

Reason:

They should add up to 1.

- (f) Denis looked at the data and said “I can find out how many people in the survey normally listen to local radio”. Do you agree or disagree with Denis? Explain your answer.

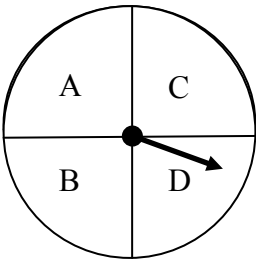
| | |
|--------------|--|
| Answer: | No. |
| Explanation: | Some people may not listen to any radio at all. |

Question 8

Jack rolls a fair die and spins a fair spinner as shown.



Die



Spinner

- (a) Complete the table below showing all possible outcomes.

| | | Spinner | | | |
|-----|---|---------|-------|-------|-------|
| Die | | A | B | C | D |
| | 1 | (1,A) | (1,B) | (1,C) | (1,D) |
| | 2 | (2,A) | (2,B) | (2,C) | (2,D) |
| | 3 | (3,A) | (3,B) | (3,C) | (3,D) |
| | 4 | (4,A) | (4,B) | (4,C) | (4,D) |
| | 5 | (5,A) | (5,B) | (5,C) | (5,D) |
| | 6 | (6,A) | (6,B) | (6,C) | (6,D) |

- (b) How many possible outcomes are there?

| |
|----|
| 24 |
|----|

- (c) How many outcomes consist of an odd number and B?

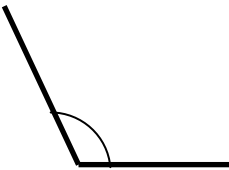
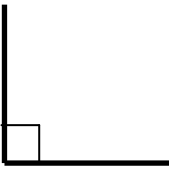
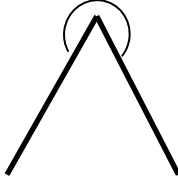
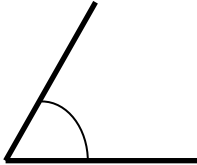
| |
|---|
| 3 |
|---|

- (d) What is the probability that an outcome will contain an even number?

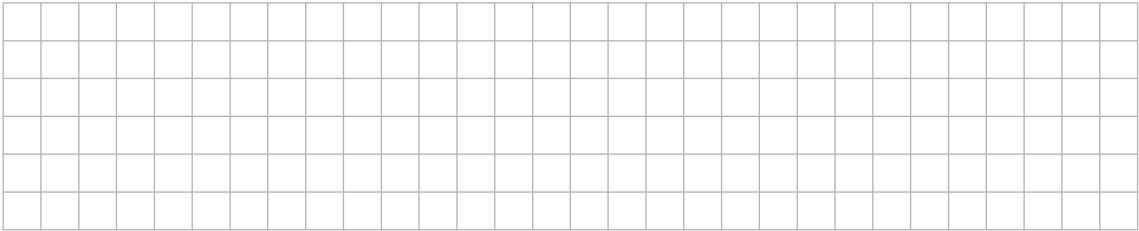
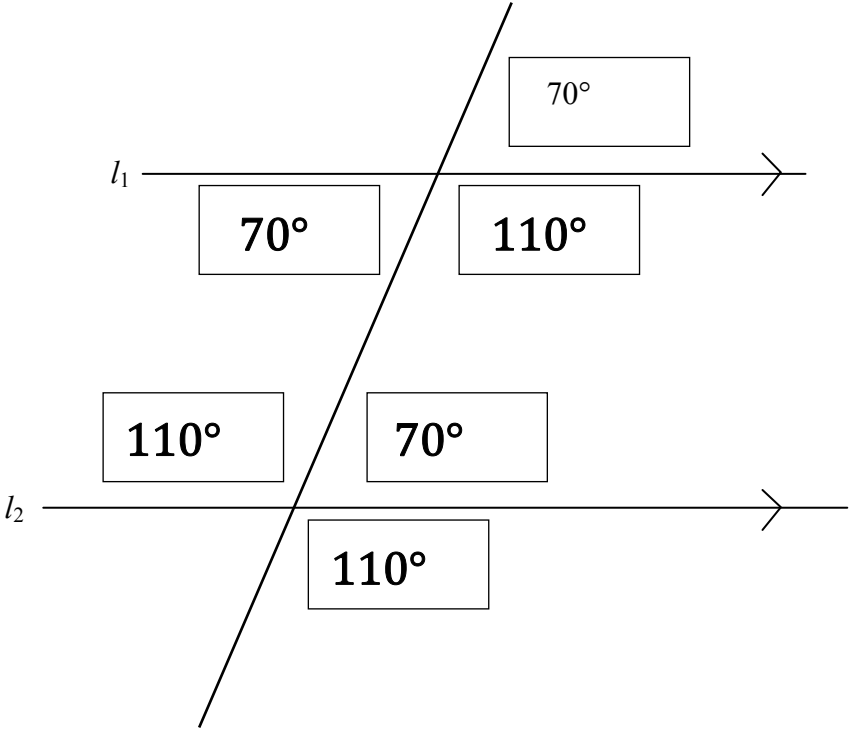
| |
|---|
| 1 |
| 2 |

Question 9

- (a) Four angles are shown below. Write in the space below each diagram whether the angle is straight, acute, obtuse, right or reflex.

| | | | |
|---|---|--|---|
|  |  |  |  |
| obtuse | right | reflex | acute |

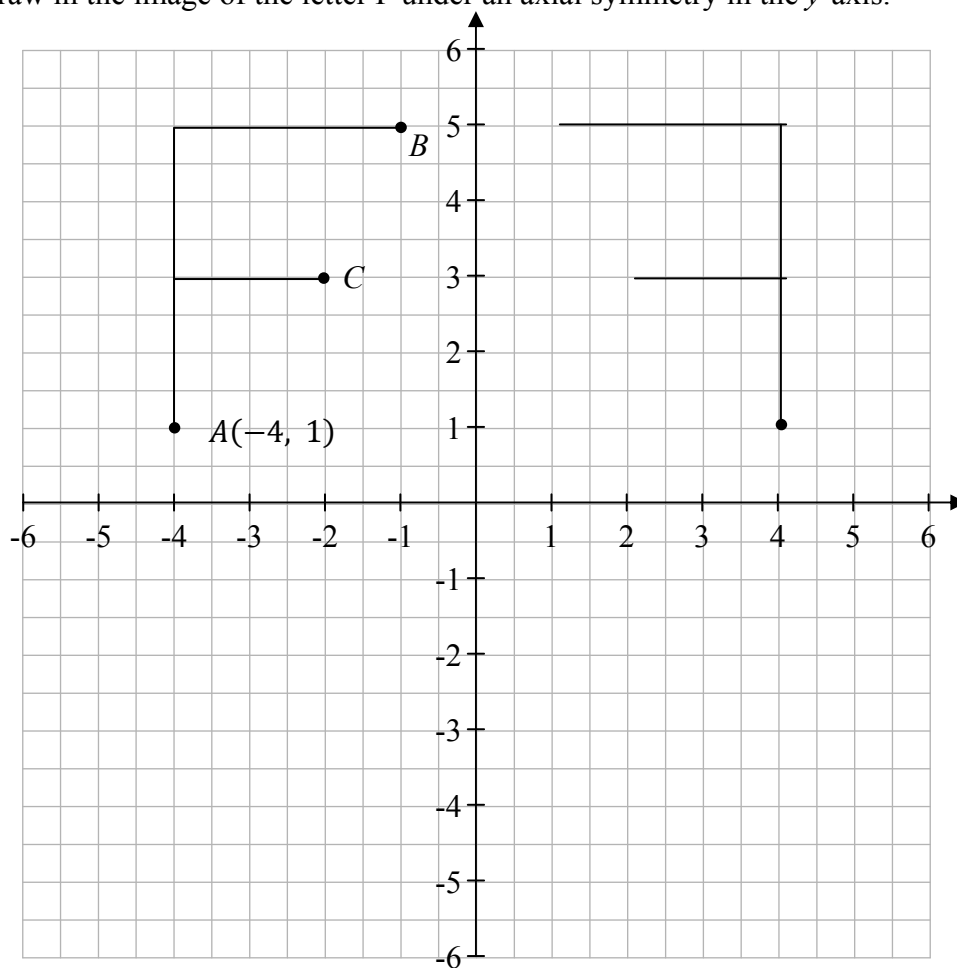
- (b) In the diagram below $l_1 \parallel l_2$. Write the measure of each angle shown by an empty box into the diagram, without using a protractor.



Question 10

The diagram below shows the letter F on the co-ordinate plane.

- (a) Draw in the image of the letter F under an axial symmetry in the y -axis.



- (b) Write down the coordinates of the points B and C .

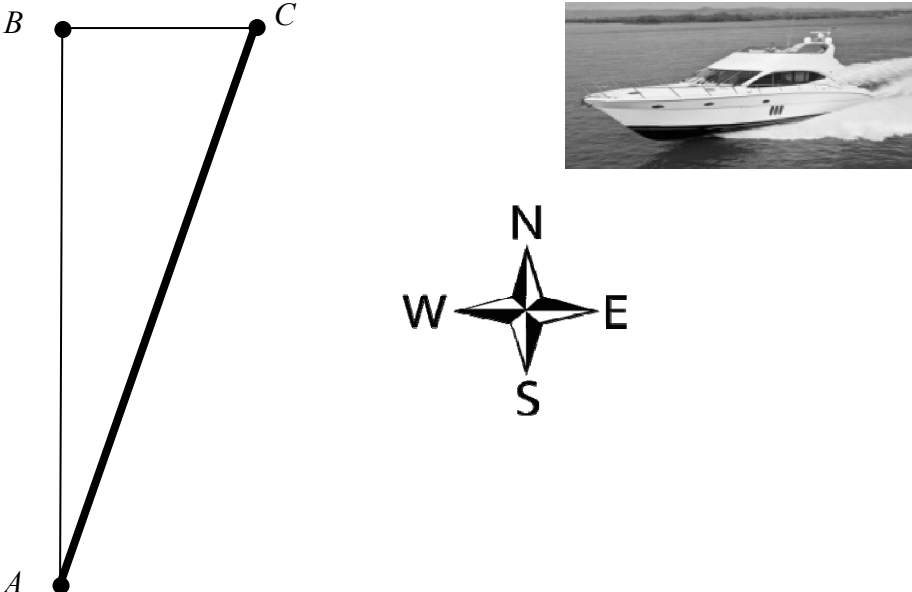
$B(-1, 5)$ $C(-2, 3)$

- (c) A , B and C are mapped onto A' , B' and C' under the transformation above. Write down the co-ordinates of A' , B' and C' .

$A'(4, 1)$ $B'(1, 5)$ $C'(2, 3)$

Question 11

A boat travels due north from A for 30 minutes at 20 km/h. It reaches B and then travels due east for 24 minutes at 10 km/h. It is then at C .



- (a)** How many kilometers has the boat travelled?

$$20 \text{ km/h for } \frac{1}{2} \text{ hour} = 10 \text{ km}$$

10 km/h for $\frac{2}{5}$ hours = 4 km

Total = 14 km

- (b)** On the diagram, draw a line segment that shows the shortest distance from C back to A .

- (c) Use Pythagoras' theorem to calculate the shortest distance from C to A . Give your answer correct to the nearest metre.

$$x^2 = 10^2 + 4^2$$

$$x^2 = 100 + 16$$

$$x^2 = 116$$

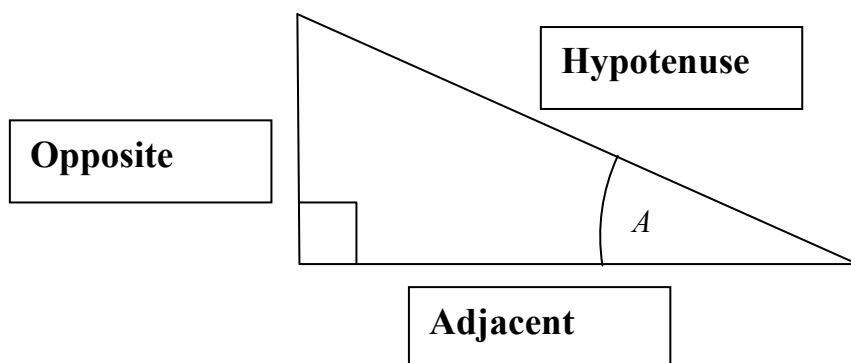
$$\mathbf{x} = \sqrt{116}$$

$$\mathbf{x} = 10.77$$

x = 11 Km

Question 12

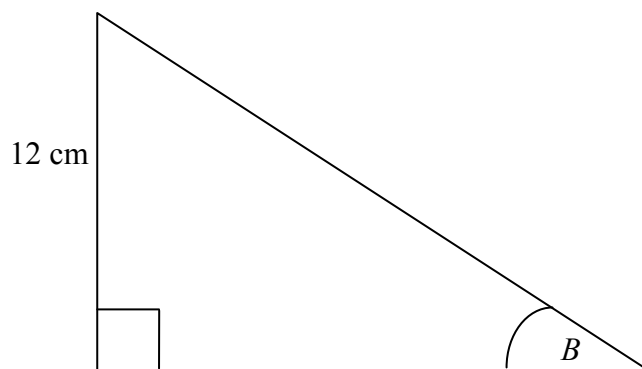
- (a) The diagram below shows the angle A in a right-angled triangle. Indicate which side is adjacent and which is opposite in relation to the angle A , and which side is the hypotenuse.



- (b) Fill in the appropriate ratios in the table below.

| Trigonometric Ratio | Ratio |
|---------------------|---|
| Sin | $\frac{\text{opposite}}{\text{hypotenuse}}$ |
| $\cos A$ | $\frac{\text{adjacent}}{\text{hypotenuse}}$ |
| tan | $\frac{\text{opposite}}{\text{adjacent}}$ |

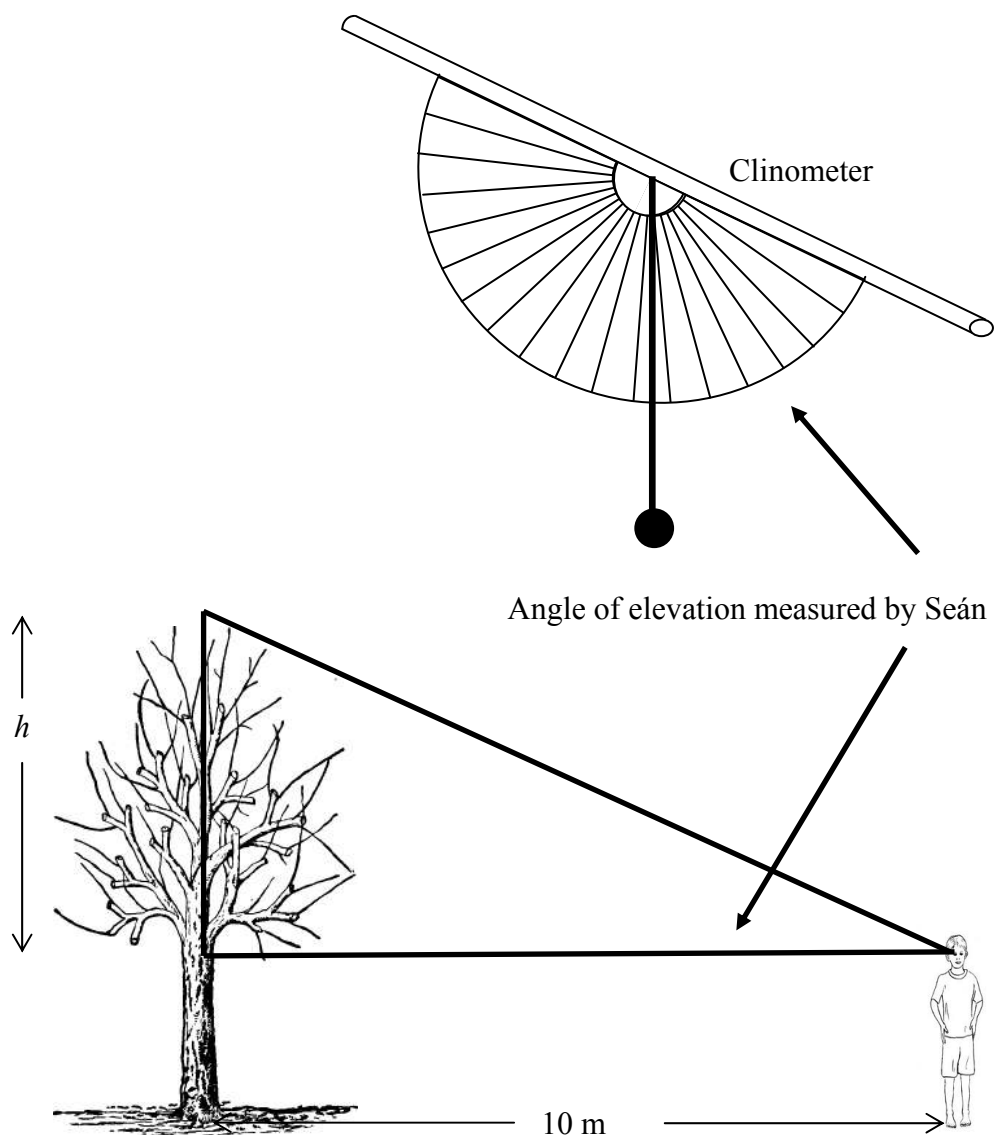
- (c) In the right angled triangle below $B = 35^\circ$ and the opposite side is 12 cm. Find the length of the hypotenuse correct to the nearest centimetre.



$$\begin{aligned}\sin 35^\circ &= \frac{\text{Opp}}{\text{Hyp}} \\ 0.5736 &= \frac{12}{x} \\ x &= \frac{12}{0.5736} \\ x &= 20.9205 \\ x &= 21 \text{ cm}\end{aligned}$$

Question 13

Seán makes a clinometer using a protractor, a straw, a piece of thread and a piece of plasticine (used as a weight). He stands 10 m from a tree and uses his clinometer to measure the angle of elevation to the top of the tree as shown. Seán is 1.75 m in height.



- (a) Find the angle of elevation by reading the clinometer above. 65°

- (b) Calculate the height h as shown in the diagram. Give your answer correct to two decimal places.

| |
|---|
| $\begin{aligned}\tan 65^\circ &= \frac{\text{Opp}}{\text{Adj}} \\ 2.1445 &= \frac{h}{10} \\ h &= 10 (2.1445) \\ h &= 21.445 \\ h &= 21.45 \text{ m}\end{aligned}$ |
|---|

- (c) Find the total height of the tree.

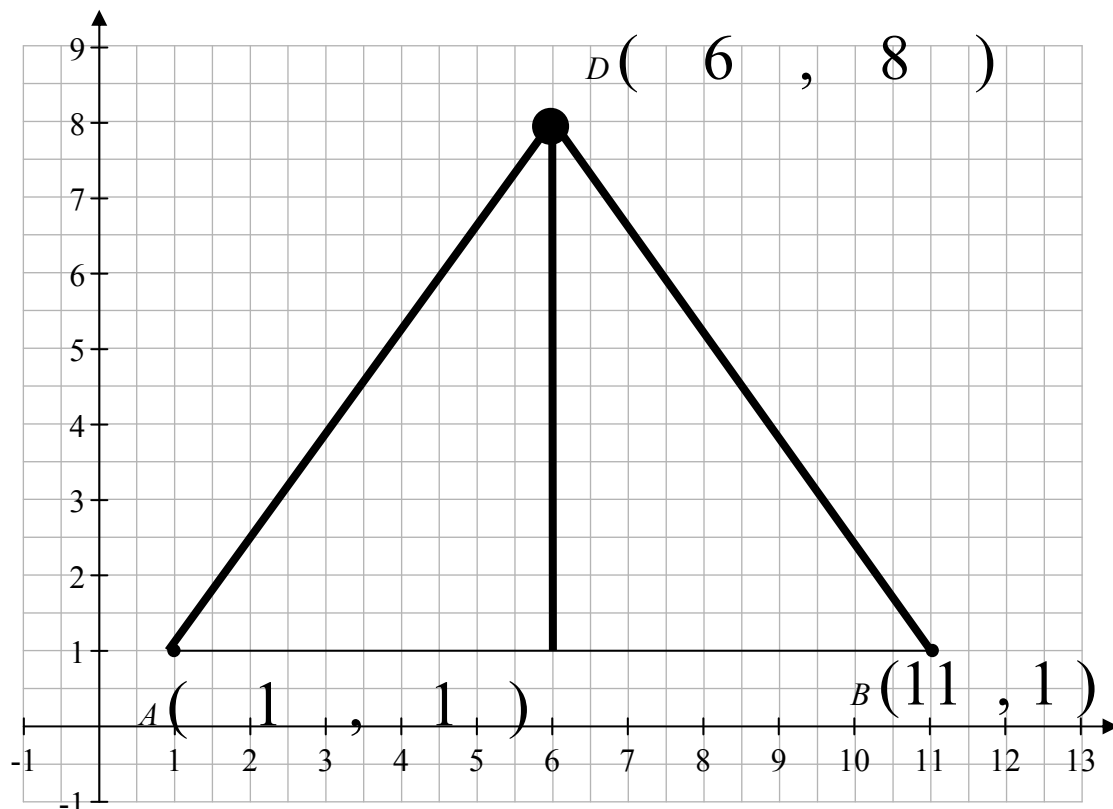
| |
|--|
| $\begin{aligned}21.45 + 1.75 \\ = 23.2 \text{ m}\end{aligned}$ |
|--|

- (d) Another student uses the same method as Seán and finds the height of the tree to be 23.1 m. Seán did not get this answer. Give one possible reason why the answers might be different.

| |
|---|
| <p>He could have used 64°.</p> |
|---|

Question 14

- (a) Write down the coordinates of point A and point B on the diagram.



- (b) Mark in the point $D(6, 8)$ on the diagram.
- (c) Find the co-ordinates of C , the midpoint of $[AB]$.

$$\left(\frac{1+11}{2}, \frac{1+1}{2} \right) = (6, 1)$$

- (d) Join A to D . Join B to D . Join C to D .
- (e) Use the distance formula to find $|AD|$ and $|BD|$.

$$\begin{aligned} & \sqrt{(6-1)^2 + (8-1)^2} \\ & \sqrt{25 + 49} \\ & \sqrt{74} \end{aligned}$$

$$\begin{aligned} & \sqrt{(6-11)^2 + (8-1)^2} \\ & \sqrt{25 + 49} \\ & \sqrt{74} \end{aligned}$$

- (f) What type of triangle is ABD ? Give a reason for your answer.

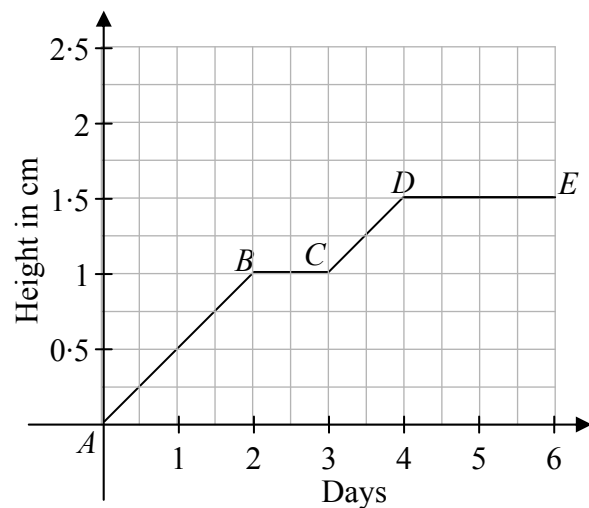
| | |
|---------|---|
| Type: | Isosceles. |
| Reason: | Two sides are the same from (e) above. |

- (g) State whether the triangles ACD and BCD are congruent. Give a reason for your answer.

| | |
|---------|---|
| Answer: | Yes, they are congruent. |
| Reason: | $AC = BC$ $AD = BD$ $CD = CD$ $\therefore \text{ S S S }$ |

Question 15

The height of a watercress seedling over six days is shown in the diagram below.



- (a) The plant grows steadily between *A* and *B*. It does not grow during two periods. Identify these two periods from the graph.

| | |
|-----------|---------------|
| Period 1: | B to C |
| Period 2: | D to E |

- (b) Find the slope of *AB* =

$$\frac{\text{Rise}}{\text{Run}} = \frac{1}{2} (= 0.5)$$

- (c) Find the slope of *CD* =

$$\frac{\text{Rise}}{\text{Run}} = \frac{0.5}{1} (= 0.5)$$

- (d) Janet says that the seedling grows at the same rate in the two growing periods. Do you agree with Janet? Give a reason for your answer.

Answer:

Yes.

Reason:

The slopes of the lines are the same.

- (e) Describe the growth of the seedling over the six days.

The seedling grows steadily for two days.

It then stops for a day.

Then it grows for a day.

Then stops growing for two more days.