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Question 1

Question 6 **(Suggested maximum time: 10 minutes)**

A bag contains red disks, blue disks and white disks. In an experiment, each student in a class of 24 takes out a disk, records the colour and replaces it. This is repeated ten times.
The results from the class are recorded in the table below.

Colour	Red	Blue	White	Total
Frequency	123	78	39	
Relative frequency $\frac{\text{Frequency}}{\text{Total}}$				
% of total (Relative frequency × 100)				

(a) In your opinion, why is the number for red greater than for blue or white?

(b) Complete the table above.

(c) Use the results from the table above to estimate the probability of getting each colour when a disk is taken from the bag.

Colour	Red	Blue	White
Probability			

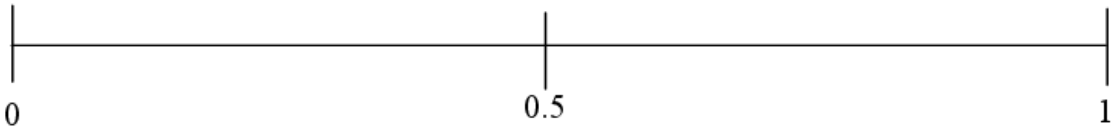
(d) Anne says that she thinks there are ten discs in the bag. Is this a reasonable suggestion? Explain your answer.

(e) Based on the information in the table, how many disks of each colour do you think are in the bag?

Question 7 **(Suggested maximum time: 10 minutes)**

(a) For each of the events A, B, C, D and E below, estimate its probability and place the letter at the most appropriate position on the probability scale below.

	Probability
A name is picked at random from a list of 50 girls and 50 boys. **A** = A girl's name is picked.	
A fair coin is tossed twice. **B** = A head is the outcome on each toss.	
One card is drawn at random from a pack of playing cards. **C** = The card is a diamond.	
A day is chosen at random from a list of the days of the week. **D** = The name of the day contains the letter **a**.	
One number is picked at random from the set {1, 2, 3, 4, 5, 7, 11, 13}. **E** = The number chosen is a prime number.	



(b) Write down another event that you think has a probability similar to that of **C** in the scale above.

(c) Write down another event that you think has a probability similar to that of **D** in the scale above.

(d) In a multiple choice quiz, three possible answers are given to a question. James does not know the answer and guesses which one is correct. Put an X on the scale above to show the probability that he has chosen the correct answer.

Question 12 **(Suggested maximum time: 5 minutes)**

During a trigonometry lesson a group of students made some predictions about what they expected to find for the values of the trigonometric functions of some angles. They then found the Sin, Cos and Tan of $25°$ and $50°$.

(a) In the table given, show, correct to three decimal places, the values they found.

$\sin 25° =$	$\cos 25° =$	$\tan 25° =$
$\sin 50° =$	$\cos 50° =$	$\tan 50° =$

(b) **(i)** Maria had said "The value from any of these trigonometric functions will always be less than 1". Was Maria correct? Give a reason for your answer.

Answer: _____

Reason:

(ii) Sharon had said "If the size of the angle is doubled then the value from any of these trigonometric functions will also double." Was Sharon correct? Give a reason for your answer.

Answer: _____

Reason:

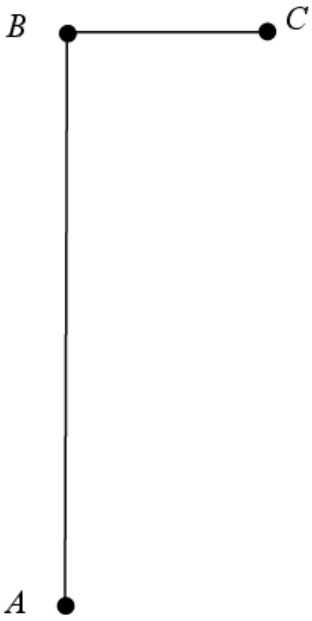
(iii) James had said "The value from all of these trigonometric functions will increase if the size of the angle is increased." Was James correct? Give a reason for your answer.

Answer: _____

Reason:

Question 4

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.



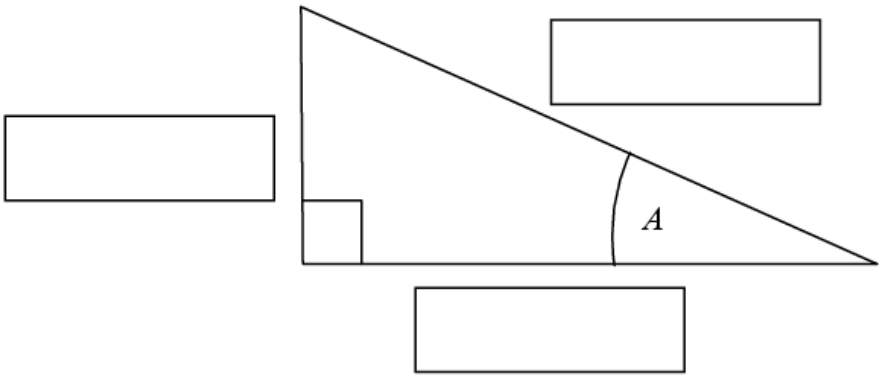
(a) How many kilometers has the boat travelled?

(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.

Question 5

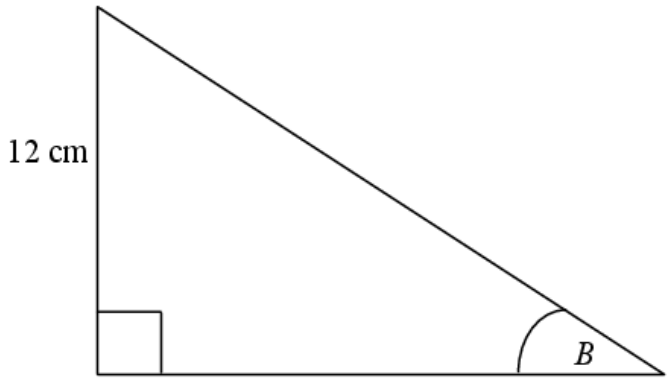
(a) The diagram below shows the angle A in a right-angled triangle. Indicate which side is adjacent and which is opposite in relation to the angle A, and which side is the hypoteneuse.



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

Trigonometric Ratio	Ratio
	$\frac{opposite}{hypotenuse}$
Cos A	
	$\frac{opposite}{adjacent}$

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



Question 6

A hurling match is played between Team A and Team B.
A player on Team A, Fiachra, has the ball and attempts to score.
The probability of Fiachra scoring a point is 0·6 and the probability of him scoring a goal is 0·1.

(a) Is Fiachra more likely to score a point or a goal?

(b) What is the probability that Fiachra will not score a point in this attempt?

A player on Team B, Peadar, has the ball and attempts to score. The probability of Peadar scoring a point is 0·7 and the probability of him scoring a goal is 0·2.

(c) Peadar is more likely to score than Fiachra.
Give a reason why this is true.

(d) A spectator says "Peadar will always score more than Fiachra in a game between the two teams".

Do you agree with the spectator?

Yes ☐ No ☐

Give a reason for your answer.

(e) A penalty is awarded to Team B.
The goalkeeper for Team A has saved 12 penalties out of 20 this season.

What is the probability that the goalkeeper will save the penalty based on his previous record?

Question 7

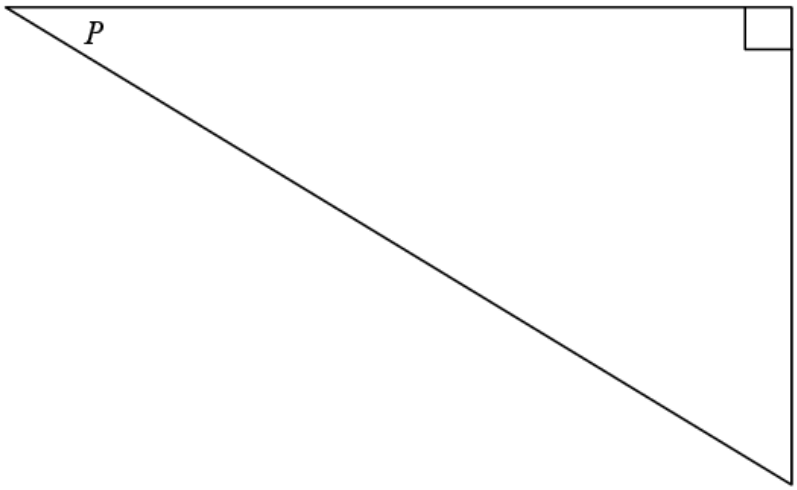
(a) Use your calculator to find the following trigonometric ratios.
Write each answer correct to four decimal places.

sin 25° = _____

cos 39° = _____

tan 40° = _____

(b) The angle P is shown in the triangle below.

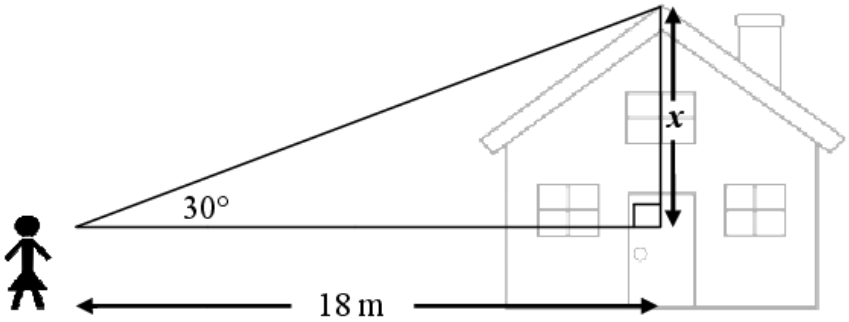


(i) On the diagram, clearly label the side opposite the angle P.

(ii) On the diagram, clearly label the side adjacent to the angle P.

(iii) If the length of the opposite side is 9 and the length of the adjacent side is 12, find the length of the hypotenuse.

Question 8



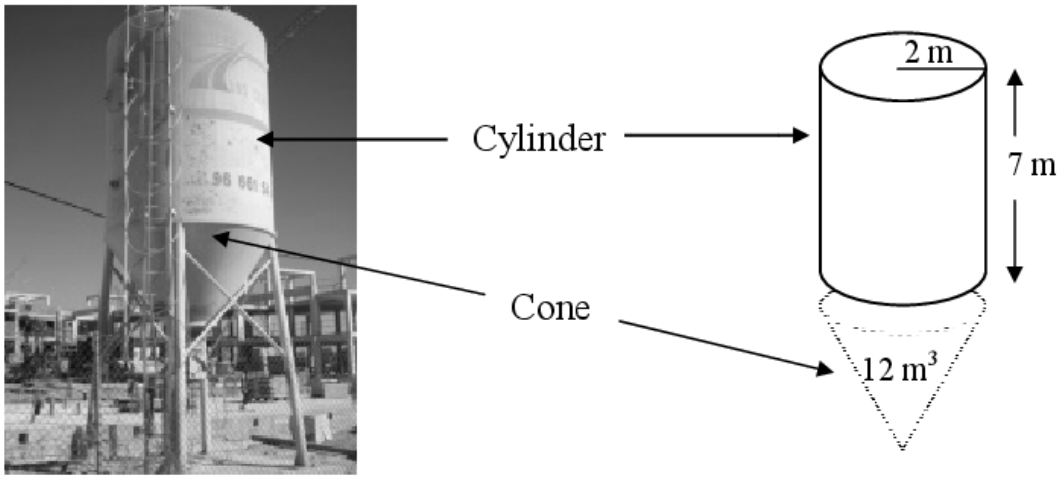
Jasmine wants to find the height of her house. She measures the angle of elevation of the top of the roof using a clinometer. The angle is 30°. She is standing 18 m from the point on the ground directly below the apex of the roof. Jasmine draws the diagram above to show this information.

(a) Use Jasmine's measurements to find x.
Write your answer in metres correct to one decimal place.

(b) What other information is needed to find the height of the house?

Question 9

Cement is stored in a silo in the shape of a cylinder on a cone as shown in the diagram.



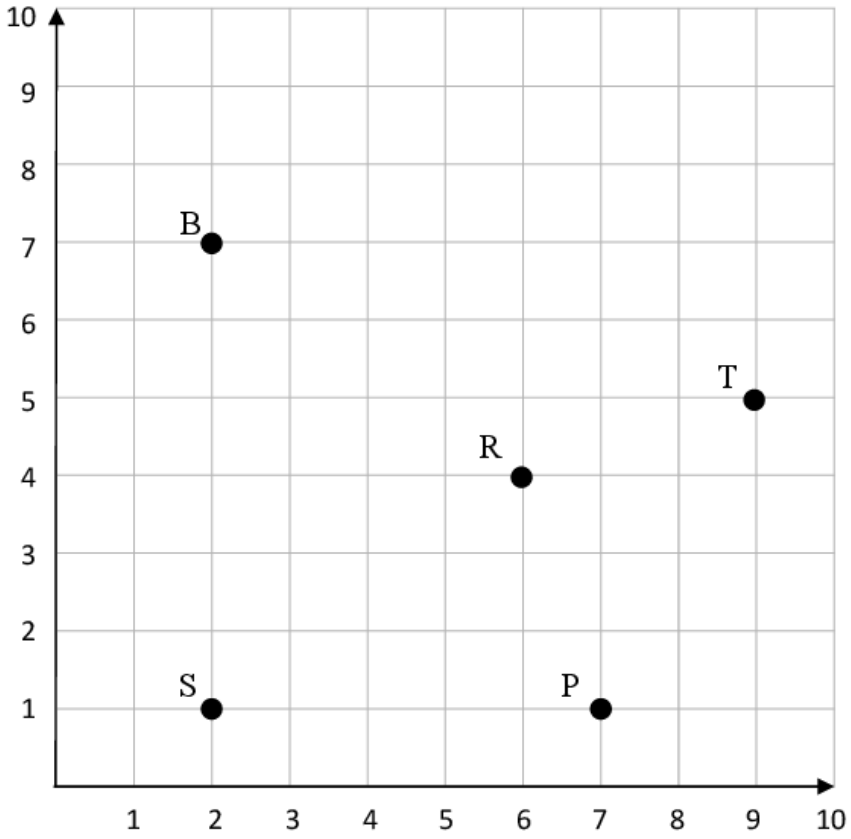
(a) The height of the cylinder is 7 m and the radius is 2 m.
Find the volume of the cylinder. Use $\pi = 3{\cdot}142$.
Give your answer correct to the nearest m^3.

(b) The volume of the cone is 12 m^3.
Find the total volume of cement in the silo when it is full. Give your answer correct to the nearest m^3.

(c) If 1 m^3 of cement weighs 2·5 tonnes, what is the total weight of the cement in the silo?

Question 10

An archaeologist has discovered various items at a site. The site is laid out in a grid and the position of each item is shown on the grid. The items found are a brooch (B), a plate (P), a ring (R), a statue (S) and a tile (T).



(a) Write down the co-ordinates of the position of each item.

B = (2 , 7)

P = (,)

R = (,)

S = (,)

T = (,)

(b) Each square of the grid represents 1 m^2.
Find the total area of the grid.

(c) Which of the items is nearest to the tile (T)?

(d) Find the distance between the brooch (B) and the statue (S).

(e) What is the slope of the line from the plate (P) to the brooch (B)?

Question 11

Barra is comparing the cost of electricity supplied by two companies.
He used 510 units last month.

(a) Fill in the following tables:

GRIDPOWER	€
Standing charge	9·47
18·5 cent per unit	
Sub-total	
13·5% VAT	
Total	

ELECTROLINE	€
No standing charge	
First 50 units free Then 25 cent per unit	
Sub-total	
13·5% VAT	
Total	

(b) What is the difference between the bills of the two companies?

(c) Barra contacted the more expensive company. The company offered him a 10% discount off his total bill.
In your opinion, from which company should Barra get his electricity?
Give a reason for your answer.

Answer

Reason

Question 12

Pat is a waiter at a restaurant. He is paid €8·65 per hour. He can also get tips. Last week he worked for 22 hours. Pat's wages plus tips were €235·50 in total for the week.

How much did Pat make on tips last week?

Question 13

(ii) A dealer buys a car for €17 500. He sells the car for €23 800.
Calculate his profit as a percentage of the cost price.

Question 14

3(c) **(i)** €20 000 is invested at $5 \cdot 2\%$ per annum.
What is the amount of the investment at the end of one year?

(ii) €5000 is withdrawn from this amount at the beginning of the second year.
The interest rate for the second year is $6 \cdot 25\%$ per annum.
What is the amount of the investment at the end of that year?

Question 15

4(b) **(i)** Solve the equation $5x - 10 = 3(x + 2)$.

(ii) Multiply $(x - 3)$ by $(2x + 1)$.
Write your answer in its simplest form.

Question 16

2(b) **(i)** On a day when €1 = £0·68, find the value in euro of £816.

Question 17

4(c) Shane is x years old. Eileen is three years younger than Shane.

(i) Find Eileen's age in terms of x.

(ii) If the sum of Shane's age and Eileen's age is 47,
write down an equation in x to represent this information.

(iii) Solve the equation that you formed in part **(ii)** above, for x.

(iv) When Eileen is $2x + 5$ years old, find the sum of Shane's age and Eileen's age.

Question 18

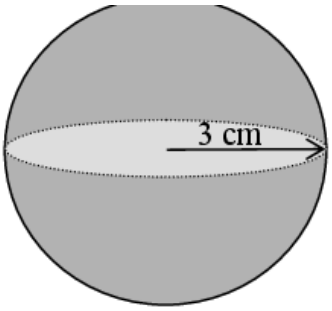
2(b) **(i)** On a day when €1 = \$1·21, find the value in euro of \$6655.

Question 19

3(b) **(i)** Vat at 21% is added to a bill of €750.
Calculate the total bill.

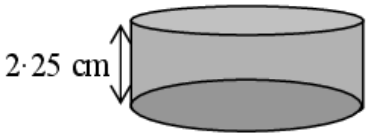
Question 20

2(c) A solid metal sphere has a radius 3 cm.



(i) Taking π as 3·142 find, in cm^3, the volume of the solid metal sphere.

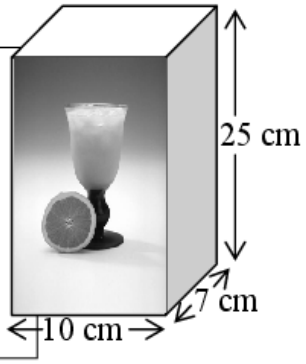
(ii) The solid metal sphere was melted down and a quarter of the metal was recast to form a cylinder of height 2·25 cm. Taking π as 3·142 calculate, in cm, the radius of this cylinder.



Question 21

2(c) **(i)** A rectangular carton full of orange juice measures 10 cm by 7 cm by 25 cm.

Find, in cm^3, the volume of orange juice in the carton.



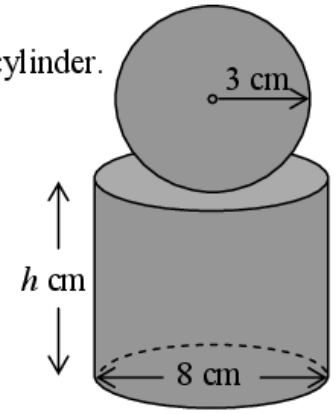
(ii) The orange juice fills 14 cylindrical glasses exactly.

Find, in cm^3, the volume of each glass.

(iii) The radius of each glass is 2·4 cm. Taking π as 3·14, calculate the height of each glass, correct to the nearest cm.

Question 22

2(c) A solid trophy, as shown, has a sphere mounted on top of a cylinder. The radius of the sphere is 3 cm.



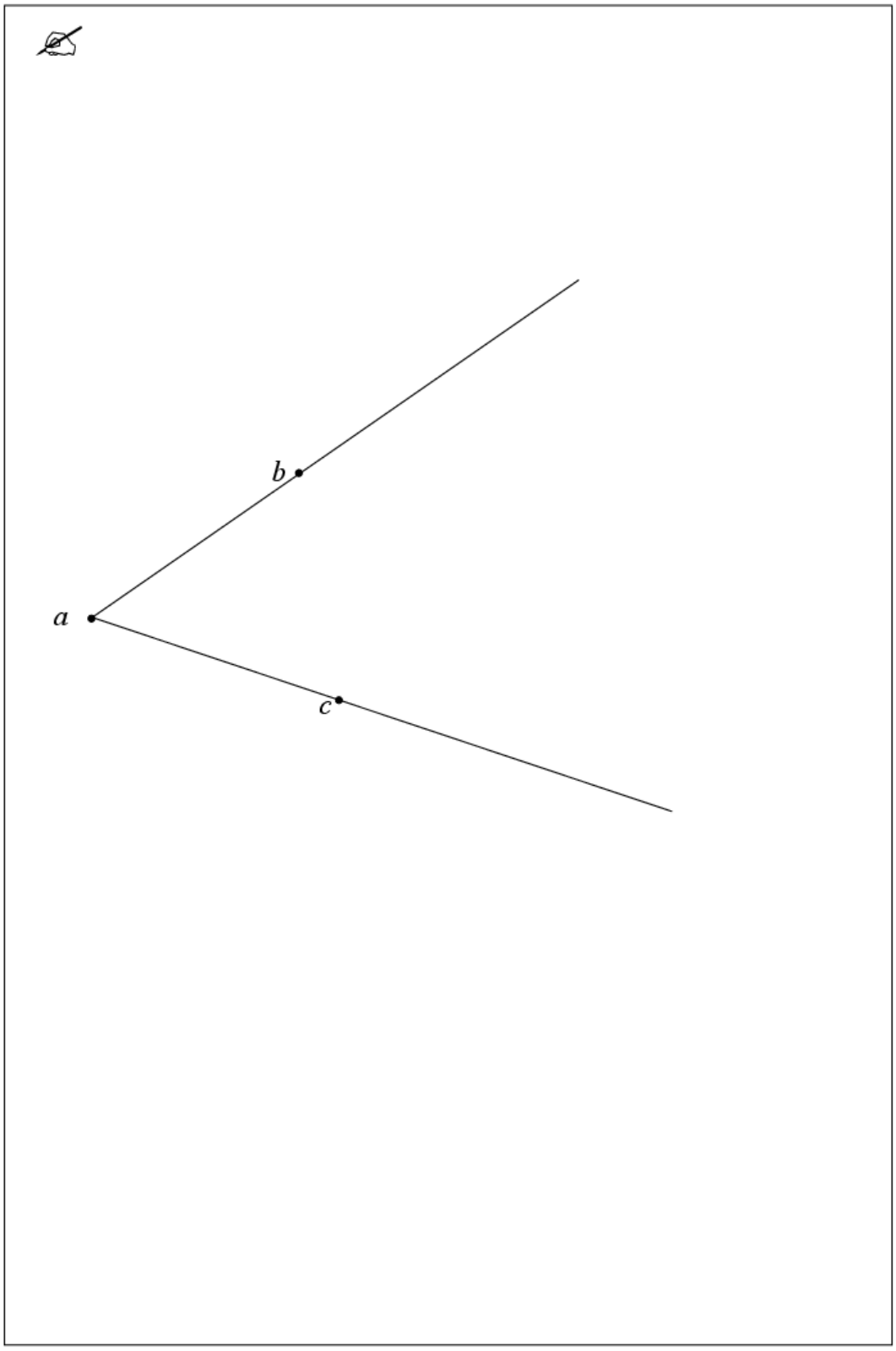
(i) Find the volume of the sphere in terms of π.

(ii) The cylinder in the trophy has a diameter of 8 cm and its volume is four times the volume of the sphere.
Find h, the height of cylinder in the trophy.

(iii) Find the total height of the trophy.

Question 23

(iii) Bisect the given angle $\angle bac$ without using a protractor.
Show all construction lines.



Question 24

(c) **(i)** €12 000 is invested at 2% per annum.

What is the amount of the investment at the end of the first year?

Question 25

5. **(a)** Solve the equation $3(x - 2) = 2x + 5$.

Question 26

(b) **(i)** Dara left Lucan by car at 09:25 and arrived in Sligo at 11:55.

How long did it take Dara to travel from Lucan to Sligo?
Give your answer in hours and minutes.

(ii) The distance from Lucan to Sligo is 195 km.

Calculate Dara's average speed, in km/h.

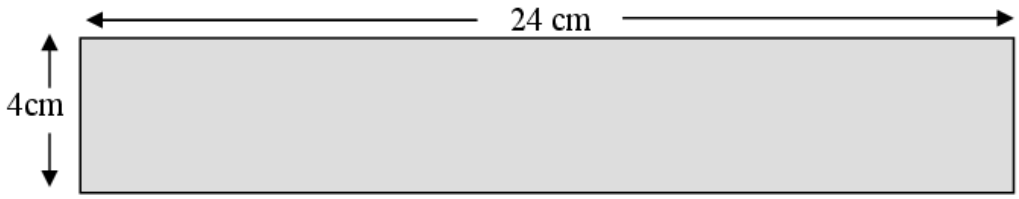
(iii) On the return journey from Sligo to Lucan, Dara's average speed was 60 km/h.

How long, in hours and minutes, did the return journey take?

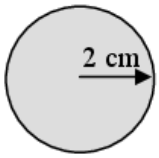
Question 27

(c) **(i)** A rectangular piece of silver measures 4 cm by 24 cm.

Find, in cm^2, the area of the piece of silver.



(ii) Brian wants to cut circular discs of radius 2 cm from the piece of silver.



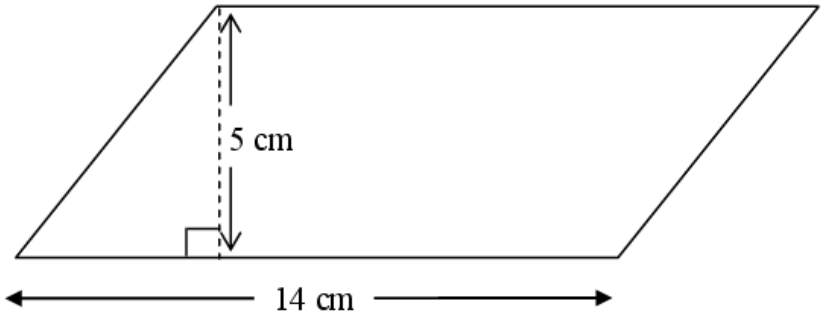
What is the greatest number of discs that he can cut from the piece?

(iii) Taking π as 3·142, find in cm^2, the area of the silver remaining after the discs have been cut out.

Give your answer correct to one decimal place.

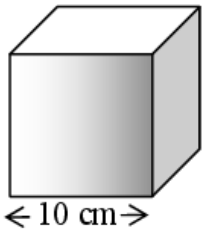
Question 28

2. **(a)** A parallelogram has dimensions as shown in the diagram.

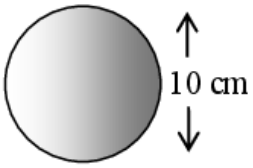


Find, in cm^2, the area of the parallelogram.

(b) **(i)** A cube with side length 10 cm is shown.
Find, in cm^3, the volume of the cube.



(ii) A sphere with diameter 10 cm is shown.
Taking π as 3·142 find, in cm^3, the volume of the sphere.
Give your answer to the nearest whole number.

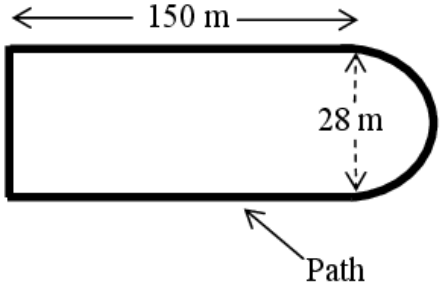


(iii) Express the volume of the sphere in **(ii)**, as a percentage of the volume of the cube in **(i)**.

(c) A park is in the shape of a rectangle with a semicircular end.

The rectangle is 150 m long and 28 m wide.
The diameter of the semicircular end is also 28 m.

There is a path around the park which is used for walking and jogging.



(i) Taking π as 3·142, calculate the length of the semicircular end.
Give your answer to the nearest metre.

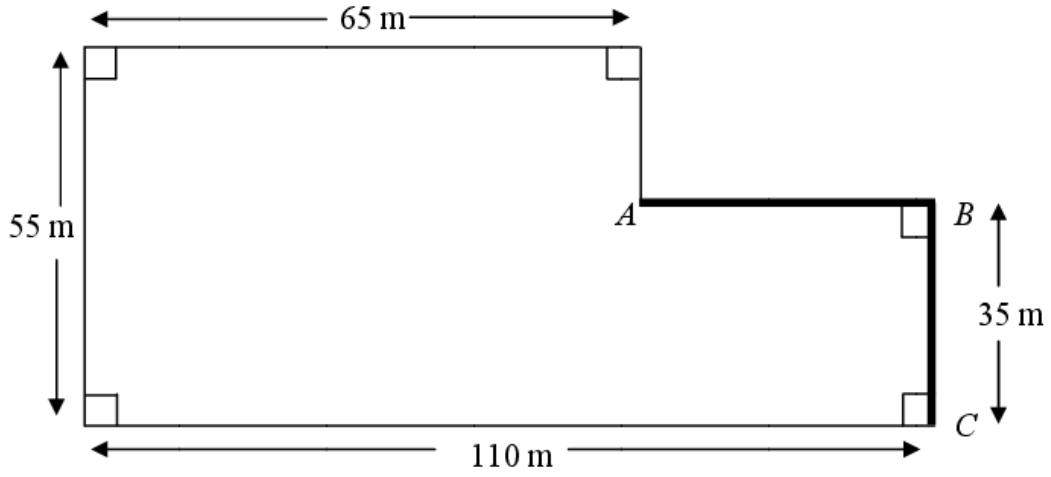
(ii) Calculate the total length of the path around the park.

(iii) Barbara wishes to jog 2·5 km.

How many laps of the path must she complete to ensure that she jogs this distance?

Question 29

(c) The shape and measurements of a field are shown in the diagram below.



(i) Find the length $|AB|$.

(ii) Find the length of the perimeter of the field.

(iii) The sections $[AB]$ and $[BC]$ are stone walls.
A farmer wishes to put fencing around the rest of the field.
The fencing costs €62·50 per 5 metres.

Find the cost of the fencing.

Question 30

4. **(a)** Using only a compass and straight edge, construct the perpendicular bisector of $[AB]$.

Show all construction work.