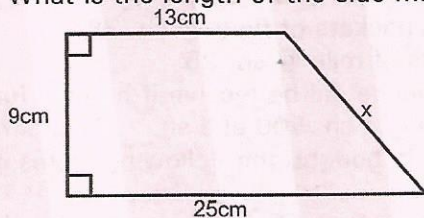
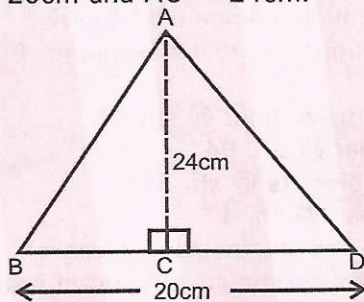


- Patrick used a ladder to paint the top of a wall. He placed the bottom of the ladder 3.6 metres away from the wall. The ladder touched the wall at a height of 4.8 metres. What was the length of the ladder?
- A rectangular bed measures 1m by $1\frac{1}{3}$ m. What is the length of the diagonal of that bed in metres?
- Which of the following will NOT form a right angled triangle?
 - $1\frac{2}{5}$ cm, $4\frac{4}{5}$ cm, 5cm
 - 2.8m, 5.25m, 5.95m
 - $\frac{5}{11}$ m, $1\frac{1}{11}$ m, $1\frac{2}{11}$ m
 - 3.9cm, 5.2cm, 7.5cm
- The diagonals of a rhombus are 30m by 16m respectively. What is the measurement of the sides?
- The area of a right angled triangle is 96cm^2 . If the height of the triangle is 16cm, what is the length of the longest side in cm?
- A rectangle measures 0.7m by 2.4m. What is the length of the diagonal in metres?
- What is the length of the side marked x?

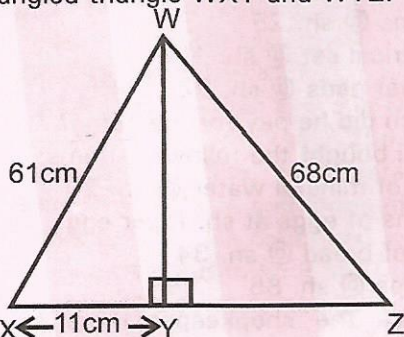


- An aeroplane flew 800km due North and then 1500km due East. What is the shortest possible route from the starting point?
- In the figure below $AB = AD$. Line $BD = 20\text{cm}$ and $AC = 24\text{cm}$.



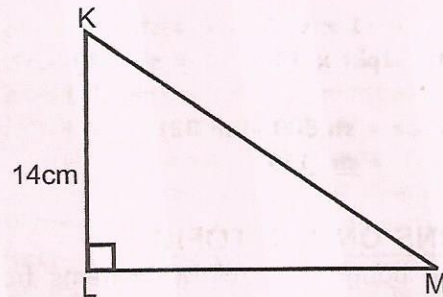
What is the length of the side AD?

- The figure below is formed by two right angled triangle WXY and WYZ.



What is the measure of line XZ?

- The figure below represents a right angled triangle KLM. The area is 22cm^2 and side



- A plot of land is in the shape of a right-angled triangle. The length of the longest side measures 41 metres while one of the shorter sides measures 9 metres. What is the perimeter of the plot?
- The diagonals of a rectangular room measures 40 metres. If one side of the room measures 32 metres, what is the measurement of the other side in metres?
- The top of a ladder 20 metres long, leans on a wall. The ladder touches the wall at a height of 12 metres. What is the horizontal distance from the bottom of the ladder to the wall?

BILLS

WORKED OUT EXAMPLES

Example 1:

Omolo bought the following items from the market.

- 2 loaves of bread at sh.22
- 2kg of sugar at sh.62 per kg
- 1 packet of unga at sh.58
- 2 packets of tea leaves at sh.75
- $\frac{3}{4}$ kg of meat at sh.160 per kg

How much did he pay for all the items?

loaves 2 x sh.22	= sh. 44
Sugar 2kg x sh.62	= sh.124
Unga 1pkt x sh.58	= sh. 58
Tea leaves 2 pkts x sh.75	= sh.150
Meat $\frac{3}{4}$ kg x 160	<u>= sh.120</u>
	<u>= sh.496</u>

Example 2:

The list below shows prices of some items in shop.

ITEM	PRICE
Rice	sh.60 per kg
Wheat flour	sh.78 per 2kg
Batteries	sh. 50 per pair
Tissue paper	sh.15 each
Match box	sh.3 each
Tooth paste	sh.40 per packet

Njeri bought 2kg of rice, 2kg wheat flour, a pair of batteries, two tissue papers, a match box and 1 packet of tooth paste. If she paid for these items using a sh.500 note, how much did she receive as her balance?

Rice	2kg x 60	= sh.120
Wheat flour	2kg	= sh. 78
Batteries	1pair x 50	= sh. 50

Match box	1 x sh.3	= sh. 3
Tooth paste	1pkt x 40	= sh. 40
		sh. 321
Balance	= sh.500 - sh.321	
	= sh. 179	

QUESTIONS ON THE TOPIC

- Zipporah bought the following items from a shop:
 - 2 kg of meat @ sh. 240
 - 2 pumpkins @ sh. 40
 - 2 kg packets of rice for sh. 83
 - ½ kg tea masala for sh. 110
 What balance did she receive from the shopkeeper if she gave a sh. 1,000 note?
- Obiero bought the following items from a shop:
 - 3 kg of rice @ sh. 84
 - 3 packets of milk @ sh. 27
 - 3 loaves of bread @ sh. 32
 - 500g tea leaves for sh. 124
 What balance did he get from the shopkeeper if he gave a sh. 1,000 note?
- Birongo bought the following items:
 - 2½ kg of rice @ sh. 84
 - 3 rolls of tissue papers @ sh. 24
 - 3 bar soaps @ sh. 56
 - 2 - ½ litre packets of milk @ sh. 27
 - ¾ kg of meat @ sh. 180
 If he gave the shopkeeper a sh. 1,000 note how much balance did he get?
- Kalweo bought the following items;
 - 2 kg meat for sh. 400
 - 1500ml of paraffin @ sh. 84 per litre
 - 1½ kg tin of cooking fat @ sh. 150
 - 4 rolls of tissue paper @ sh. 24
 How much did he pay for the items?
- Kagendo bought the following items from a shop:
 - 1½kg of rice @ sh. 84
 - 2 - ½ litres packets of yorghurt @ sh. 50
 - 3 litres of paraffin at sh. 63 per litre
 - 5 rolls of tissue paper @ sh. 22
 She paid for the items using three sh. 200 notes. How much balance did she get?
- During a home coming party for a member of parliament, the following things were bought:
 - 12 crates of 500ml soda @ sh. 672
 - 8 crates of 300ml soda @ sh. 360
 - 4 crates of one litre soda @ sh. 864
 - 400 packets of biscuits @ sh. 30
 How much money was spent to buy all these things?
- Kago bought the following items from a shop:
 - 2 - 2 kg tins of cooking fat @ sh. 380
 - 3 kg of rice @ sh. 84
 - 2 kg packet of unga for sh. 65
 - 500 millilitres of paraffin @ sh. 70 per litre
 How much did he pay for the items?
- Stephen bought the following items from a

- 3½ kg of Kales @ sh. 24
 - 2 kg packets of unga @ sh. 74
 - 1½ kg of sugar @ sh. 68
- He paid for the items using three sh. 200 notes. How much balance did he get?
- Miriam bought the following items:
 - 3½ litres of kerosene at sh. 42 per ½ litre bottle
 - 2 kg tin of cooking fat @ sh. 216
 - 3 - ½ litre packets of milk @ sh. 25
 - 4 rolls of tissue papers @ sh. 18
 If she gave the shopkeeper a sh. 1,000 note how much change did she get?
 - Kalonde bought the following items from a shop:
 - 2 loaves of bread @ sh. 33
 - 2 packets of maize flour @ sh. 92
 - ½ kg rice @ sh. 86 per kg
 - 3 rolls of tissue papers @ sh. 26
 - 2 kg of sugar for sh. 198
 How much did she pay for all the times?
 - Kimulu bought the following items from a shop;
 - 5 rolls of toilet paper @ sh. 23
 - 1¼ kg of sugar @ sh. 96 per kg
 - 3 - 2 kg packets of flour @ sh. 78
 - 3 packets of milk @ sh. 25
 What balance did he receive if he paid for the items using a sh. 500 and sh. 200 notes?
 - Kipchirchir bought the following items from the market:
 - 3 kg of tomatoes @ sh. 50
 - 2 kg of beans @ sh. 45
 - ½ kg onions @ sh. 30
 - 1½ kg of meat @ sh. 210
 He paid for the items using three sh. 200 notes. How much change did he get?
 - Mapambo bought the following items from a shop:
 - 2 packets of maize flour @ sh. 84
 - 1½ kg of sugar @ Sh. 94
 - 2 packets of biscuits @ sh. 34
 - 3 cakes of soap @ sh. 42
 She paid for the items using three sh. 200 notes. How much should she add in order to get sh. 100 note as change?
 - Katuku bought the following items:
 - 6 ruled exercise books @ sh. 32
 - 5 biro pens @ sh. 25
 - 1 geometrical set @ sh. 140
 - 2 loose leaf pads @ sh. 82
 How much did he pay for the items?
 - Mwachofi bought the following items:
 - 5 bottles of mineral water @ sh. 20
 - 1½ dozens of eggs at sh. 8 per egg
 - 3 loaves of bread @ sh. 34
 - 2 bar soaps @ sh. 85
 If he gave the shopkeeper three sh. 200 notes, how much balance did he receive?

TIME, DISTANCE AND SPEED

WORKED OUT EXAMPLES

Example 1:

A motorist left Nakuru at 11.15a.m for Nairobi a distance of 210 km. He covered the first 150km in 75 minutes and stopped for 10 minutes to buy fruits. He continued with the journey arriving in Nairobi at 12.45 p.m. What was the average speed for the whole journey?

$$\text{Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$\begin{aligned}\text{Time taken} &= \text{Arrival Time} - \text{Departure Time} \\ &= 12.45\text{p.m} - 11.15\text{a.m} \\ &= 1\frac{1}{2} \text{ hrs} \\ &= \frac{210}{1.5\text{hrs}} \\ &= 140 \text{ km/hr}\end{aligned}$$

Example 2:

A motorist covers 200km in $1\frac{1}{4}$ hours. How many kilometers will he have covered from 8.30 a.m to 8.42 a.m?

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\begin{aligned}&= \frac{200\text{km}}{1\frac{1}{4} \text{ hr}} \\ &= 160 \text{ km/hr}\end{aligned}$$

$$\begin{aligned}\text{Time taken} &= 8.42 \text{ a.m} - 8.30 \text{ a.m} \\ &= 12 \text{ minutes or } \frac{1}{5} \text{ hr}\end{aligned}$$

$$\begin{aligned}\text{Distance} &= \text{speed} \times \text{time} \\ &= 160\text{km/hr} \times \frac{1}{5} \text{ hr} \\ &= 32\text{km}\end{aligned}$$

QUESTIONS ON THE TOPIC

1. A bus left Mombasa at 2140h on Sunday. It took 8 hours 40 min to reach Nairobi. When did it reach Nairobi?
2. A bus left Nakuru at 11.30a.m and travelled to Nairobi, a distance of 240km. The bus travelled at an average speed of 80km/h. At what time did the bus reach Nairobi?
3. A bus travelling from Nakuru to Nairobi at an average speed of 80km/h took 1hr 48 minutes. Another car took 1hr 20 minutes to travel the same distance. What was the difference in their speeds in km/h?
4. A bus left Mombasa town for Nairobi at 2205h. It arrived in Nairobi 7 hours later. At what time did the bus arrive in Nairobi?
5. A motorist left town Q at 7.25a.m for town P a distance of 240km. He covered the first 140km in $1\frac{1}{2}$ hours and stopped for 15 minutes to fuel. He continued with the journey arriving in town P at 10.25a.m. What was the average speed for the whole journey?
6. The distance from Ziwani to Kaplenda is

distance of 200km, the bus stopped for 45 minutes for minor repairs. At what speed in km/h did he drive after the repairs if he had to arrive at the expected time?

7. A motorist took $1\frac{1}{2}$ hours to drive from Nairobi to Naivasha at an average speed of 80km/h. He stayed in Naivasha for half an hour and drove back to Nairobi and took 1hr 20 min. What was the average speed for the whole journey?
8. Kipruto took 15 minutes to cycle from home to the dispensary at an average speed of 4m/s. After staying at the dispensary for 10 min, he cycled back and took 20 min to reach home. What was the average speed, in metres per second, for the whole journey?
9. A motorist drives from his home to Nairobi at a speed of 80km/h and drives back home through the same route at 100km/h. He takes a total of 9 hours. What is the distance between his home and Nairobi?
10. Ochuodho took 12 min to run from home to school at an average speed of 15 metres per second. After staying at school for 10 minutes, he ran back and took 18 minutes to reach home. What was the average speed, in m/s?
11. Nyandika can run at an average speed of 24km/h. He started a 2000 metres race at 1415h. At what time did he cross the 1600 metre mark?
12. Omariba's watch gains 2 minutes in an hour. The watch was set correct at 8 a.m on Monday. What time did it read at 8 p.m the following day?
13. Kizito walked to the market 10km away in $1\frac{1}{2}$ hours. How long would Kizito take to walk back home if his average speed for both journeys is 5km/h?
14. Mbugua's watch loses 4 minutes in 1 hour. The watch was set correct at 9.45 a.m. What time did it read at 6.15 p.m?
15. A three and half hour meeting started 45 minutes late than scheduled. If it ended at 1.20 p.m, at what time was it supposed to have started?

TEMPERATURE AND CALENDAR

(TIME)

Example 1

The temperature of ice was -6°C . Temperature rose by 60°C . What is the new temperature?

Solution:

$$\begin{aligned}-6^{\circ}\text{C} + 60^{\circ}\text{C} &= 60^{\circ}\text{C} - 6^{\circ}\text{C} \dots\dots\dots \\ &= 54^{\circ}\text{C}\end{aligned}$$

Example 2

The temperature of a liquid was 112°C . The liquid cooled at the rate of 3°C per minute. What was

Solution:

If 1 min = 30°C

Then 15min = ?

= 15 × 3°C

= 45°C lost in 15 min

Therefore 112°C - 45°C

= 67°C

Example 3

Kamau was admitted in hospital from 13th February 2008 to 14th April 2008. How many nights did he spend in hospital?

Solution:

NB: February 2008 had 29 days i.e leap year.

13th to 29th February = (29-13) + 1 ...

(13 and 29th are both inclusive)

= 17 nights

March = 31 nights

1st to 14th April = 13 nights

(14th is not included)

Therefore = (17 + 31+13) nights

= 61 nights

Example 4

In a certain leap year, 16th February was Wednesday. What day was 1st May the same year?

Solution:

Note: In a leap year, February has 29 days. Thus:

FEBRUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			16			
			23	24	25	26
27	28	29				
		March				
			1			
			29	30	31	
		April				
						1
30						29
		May				
	1					

NOTE: Multiples of 7 (i.e 7, 14, 21 & 28) helps to find day and date. Example if 1st April is Saturday, then (1 + 28) = 29th will also be on Saturday. Therefore; 1st May will be on a Monday.

QUESTIONS ON THE TOPIC

- In the year 2004, Feb 11th was a Wednesday. What day was March 24th the same year?
- Water gained heat at the rate of 14°C per minute for 6 min. it was then allowed to lose heat at 4°C per minute. If the temperature before heating was 15°C, what was its temperature after 10 minutes?
- In the year 2004 April 10th was a Sunday. What day was February 11th the same year?
- The temperature of water was 12°C at

allowed to lose heat at a rate of 4°C per minute. At what time was the temperature of water 16°C.

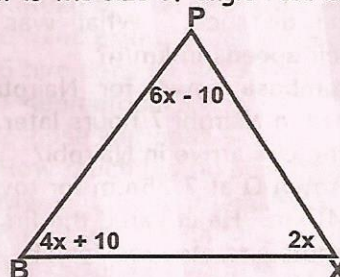
- Atwoli stayed in the hospital from 10th February 2004 to 8th April 2004. How many nights did he spend at the hospital?
- In the year 2004, January 28th was a Wednesday. What day was March 17th the same year?
- In a certain leap year, 13th April was on a Monday. What day was 10th January of the same year?
- The temperature of water was 14°C at 7.35a.m. The water gained heat at the rate of 6°C per minute for 12 min. it was then allowed to lose heat at a rate of 3°C per minute. At what time was the temperature of water reading 65°C?
- The temperature of ice was -12°C. The ice was warmed until the temperature rose to 35°C. What was the rise in temperature?
- The temperature of a certain area at noon was 25°C. At midnight the temperature was 6°C. What was the fall in temperature?
- The highest temperature during a certain day was 28°C and the lowest was -10°C. What was the difference in temperature between the highest and the lowest temperature?
- In the year 2008, Feb 5th was a Saturday. What day was March 3rd the same year?
- The temperature of water is 10°C. It is heated at the rate of 14°C per minute for 5 minutes. What was the new temperature?
- The temperature of a liquid was 108°C. It was allowed to cool at the rate of 4°C per minute for 17 minutes. What was the final reading?
- Kamande went for a holiday in Mombasa on 23rd October 2009 until 30th December 2009. How many nights did he spend in Mombasa?

GEOMETRY: ANGLES

WORKED OUT EXAMPLES

Examples 1:

What is the size of angle PBX in the triangle below?



An interior angles of a triangle add up to 180°.

Form an equation find x.

4x + 10 + 6x - 10 + 2x = 180

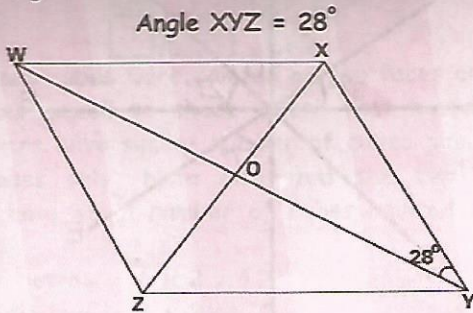
12x = 180

x = 180

Angle PMX = $4x + 10$ substitute
 $= (4 \times 15) + 10$
 $= 70^\circ$

Example 2:

In the figure below XYZW is a rhombus.



What is the size of angle XZW?

Note that:

All sides of a rhombus are equal thus $XY = YZ = ZW = WX$

Diagonals of a rhombus meet at right angles thus $\angle YOZ = \angle ZOW = \angle XOW = 90^\circ$ opposite side are parallel.

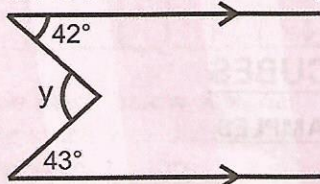
Angle YXZ = $180 - (90 + 28)$

$YXZ = 62^\circ$

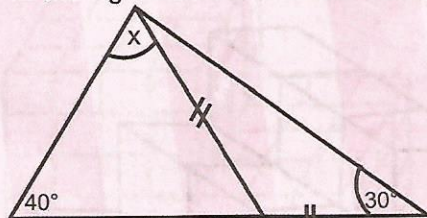
But angle $YXZ = XZW = 62^\circ$ (alternate angles)

QUESTIONS ON THE TOPIC

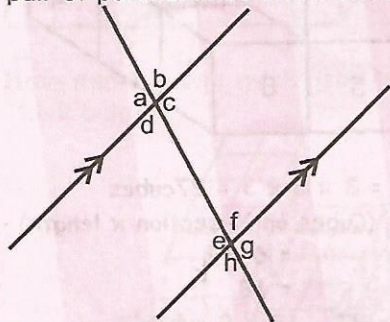
1. What is the measure of angle marked y?



2. In the figure below find the value of x.



3. The figure below shows angles formed by a pair of parallel lines and transversal.

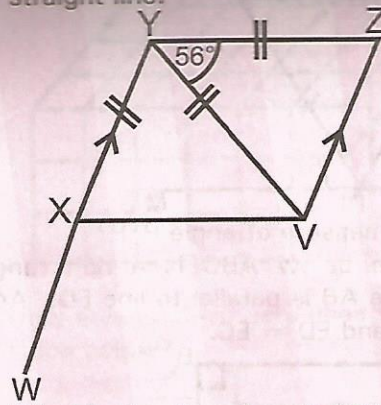


In which group below are each of the angles equal to g?

- A. a, c, f
 C. a, c, h

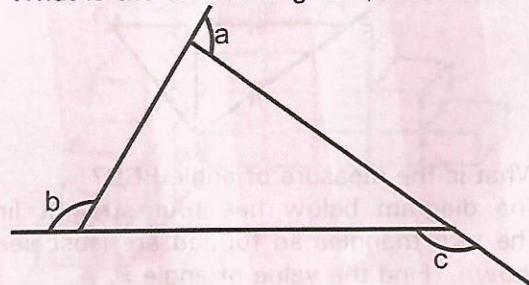
- B. b, d, e
 D. a, c, e

4. In the figure below yw is parallel to zv, line xy = yv = yz. Angle zyv = 56° and yxw is a straight line.

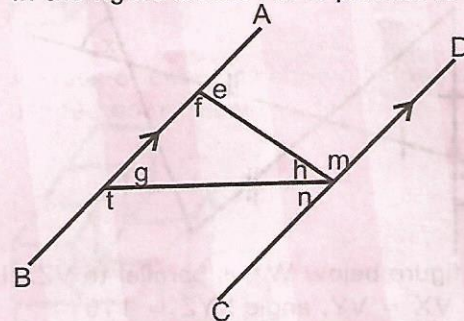


What is the size of angle VXW?

5. What is the sum of angles a, b and c?



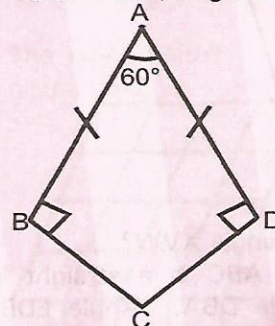
6. In the figure below AB is parallel to CD.



Which of the following is true?

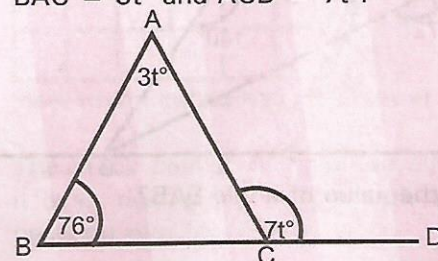
- A. $g + h + e = 180^\circ$ B. $h + n + f = 180^\circ$
 C. $g + f + n = 180$ D. $m + h + t = 180^\circ$

7. In the figure below $AB = AD$, angle $ABC = ADC = 90^\circ$, angle $BAD = 60^\circ$.



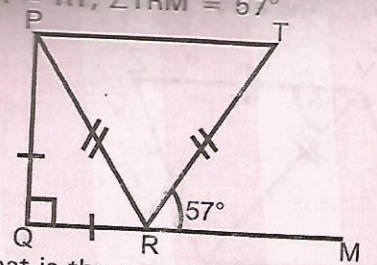
What is the size of angle BCD?

8. In the figure below angle $ABC = 76^\circ$, angle $BAC = 3t^\circ$ and $ACD = 7t^\circ$.



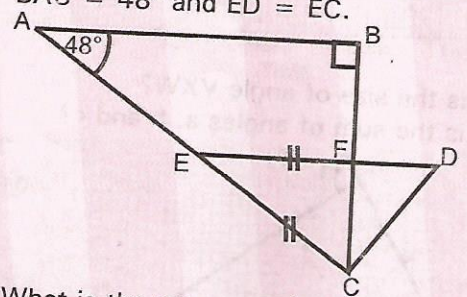
What is the value of angle ACB?

9. In the given figure $\angle PQR = 90^\circ$, $PQ = QR$, $PR = RT$, $\angle TRM = 57^\circ$



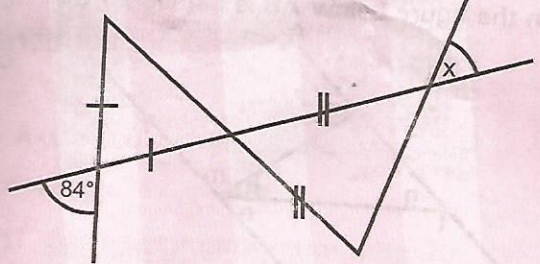
What is the measure of angle PTR?

10. In the figure below ABC is a right angled triangle. Line AB is parallel to line ED. Angle BAC = 48° and $ED = EC$.

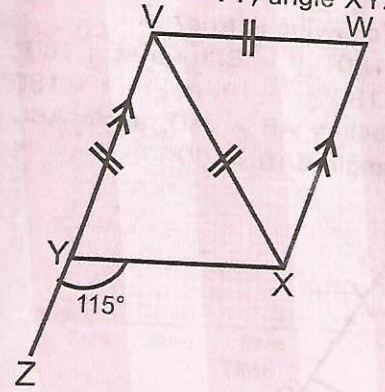


What is the measure of angle BCD?

11. The diagram below has four straight lines. The two triangles so formed are isosceles as shown. Find the value of angle x.

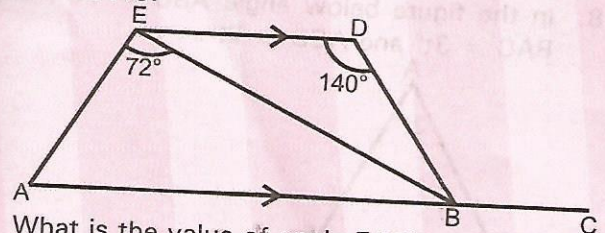


12. In the figure below WX is parallel to VZ. Line $VW = VX = VY$, angle XYZ = 115° .



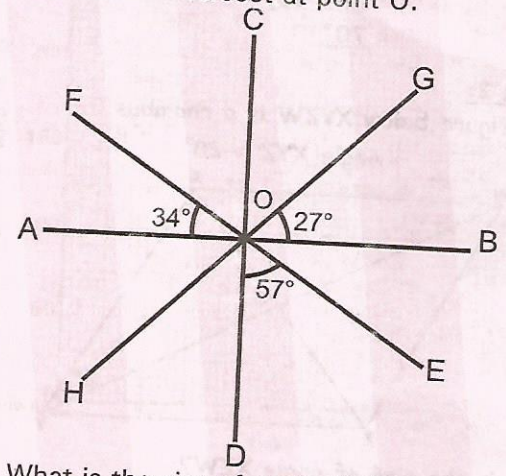
What is the value of angle XVW?

13. In the figure below ABC is a straight line. Line BE bisects angle DBA. Angle EDB = 140° and angle AEB = 72° line ED is parallel to line AC.



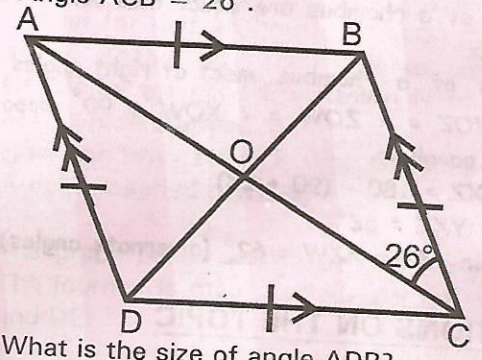
What is the value of angle EAB?

14. The figure below shows lines AB, FE, CD and GH which intersect at point O.



What is the size of angle HOD?

15. In the figure below ABCD is a rhombus. Angle ACB = 26° .



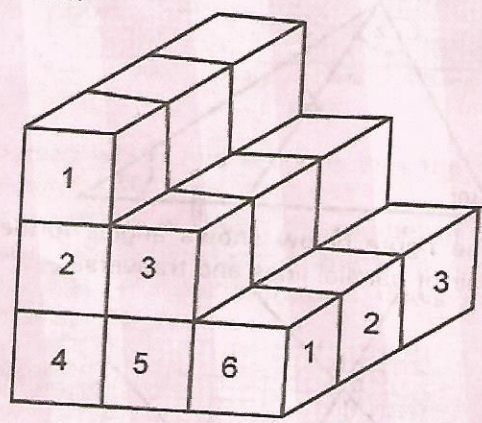
What is the size of angle ADB?

STACKS OF CUBES

WORKED OUT EXAMPLES

Example 1:

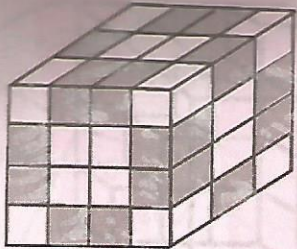
How many more cubes are needed to complete the stack below?



Expected cubes = $3 \times 3 \times 3 = 27$ cubes
 Cubes present = (Cubes on X-section \times length)
 $= 6 \times 3$
 $= 18$
 Cubes needed = $27 - 18 = 9$ cubes

Example 2:

The figure below represents a stack of cubes. The surface of the cubes were painted.



How many cubes were painted on two faces only?
 Use your pencil to shade. Note that bottom and top layers have similar number of cubes painted on two faces only. Note also that the two middle layers have equal number of cubes painted on two faces.

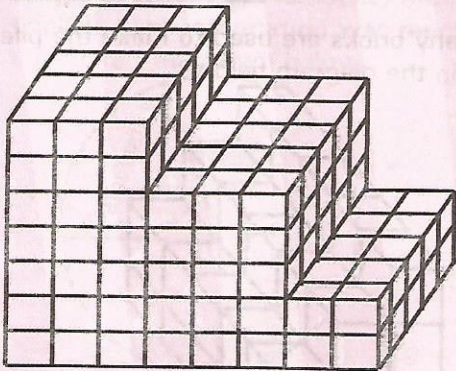
Top + bottom = $6 \times 2 = 12$

2 middle layer = $4 \times 2 = 8$

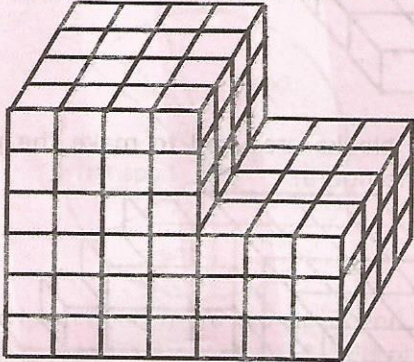
20 cubes painted on two faces.

QUESTIONS ON THE TOPIC

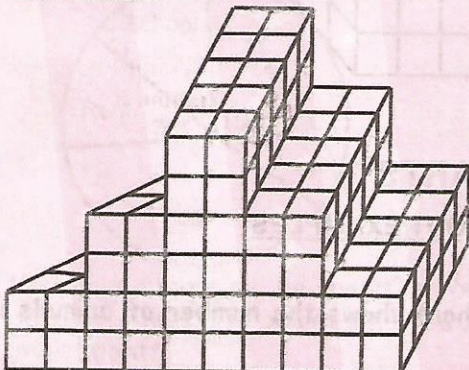
1. How many cubes were used to make the stack below?



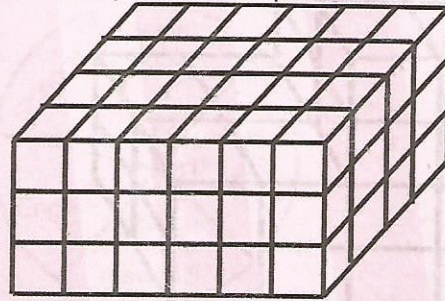
2. The stack below was painted all over. Later the stack was dismantled. How many cubes had paint on three faces?



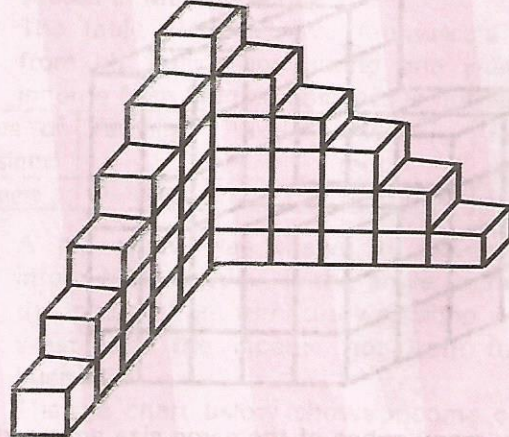
3. How many cubes were used to make the stack below?



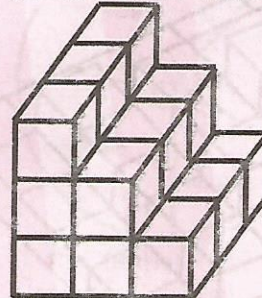
4. The stack below was dipped in black ink. How many cubes had paint on 2 faces only?



5. How many cubes were used to make the stack below?

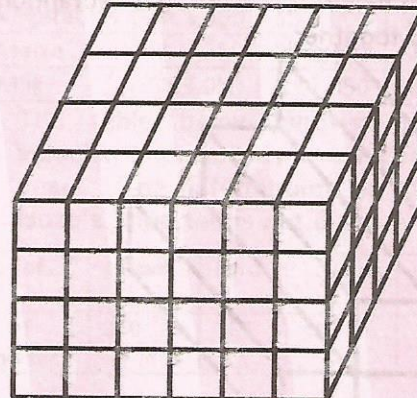


6. A stack of cubes as shown below was painted on all faces?



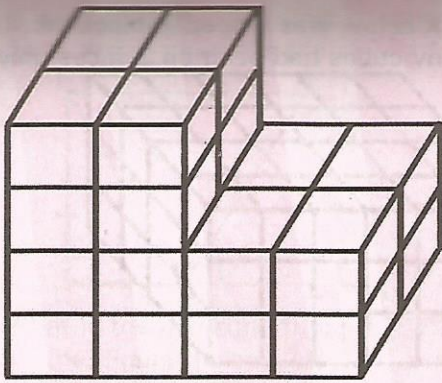
How many cubes were painted on three faces?

7. The stack below was dipped in ink and later dismantled.

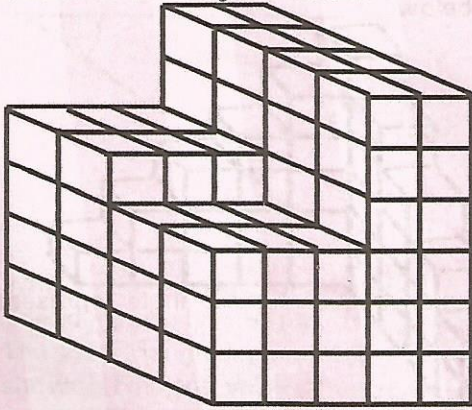


How many cubes had no paint at all?

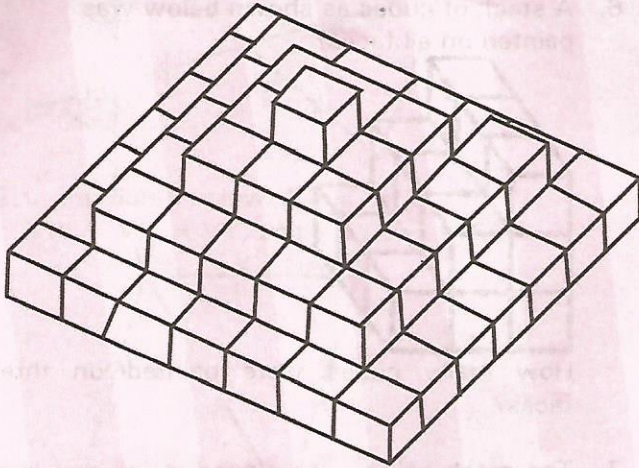
8. The stack below was painted all over. Later it was dismantled. How many cubes had paint on two faces only?



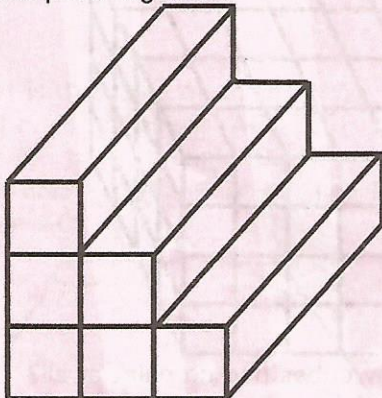
9. How many blocks are used to make the pile shown in the diagram below?



10. How many cubes of the same size are needed to build the stack below?

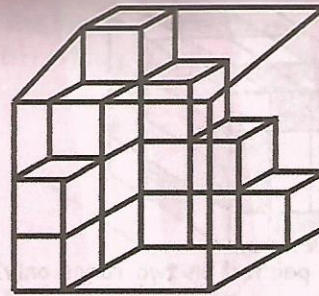


11. The diagram below represents six rectangular blocks piled together.

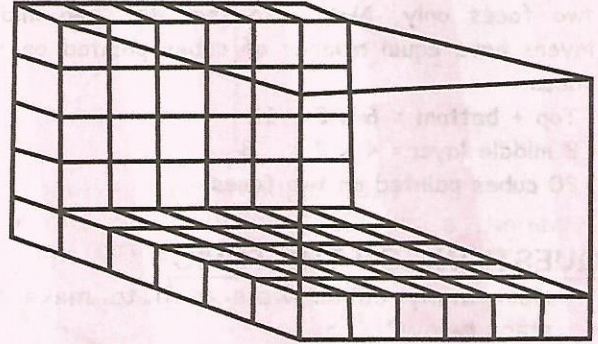


How many faces are in contact with each other?

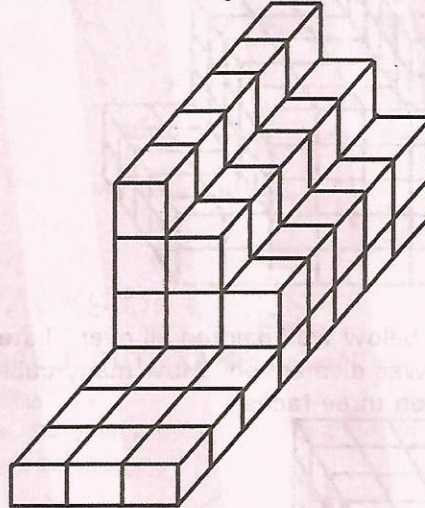
12. How many cubes are needed to fill the box below?



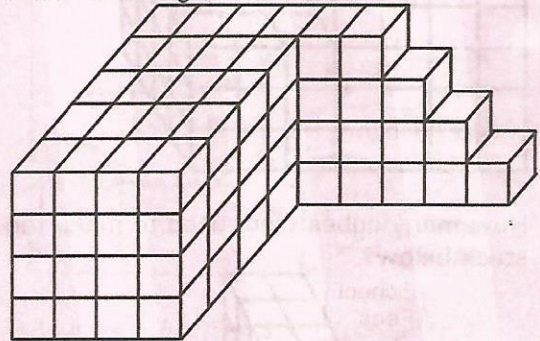
13. How many more cubes are needed to fill the box?



14. How many bricks are used to make the pile shown in the diagram below?



15. How many blocks are used to make the pile shown in the figure?

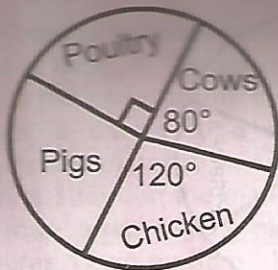


PIE CHARTS

WORKED OUT EXAMPLES

Example 1:

The pie chart shows the number of animals in a farm.



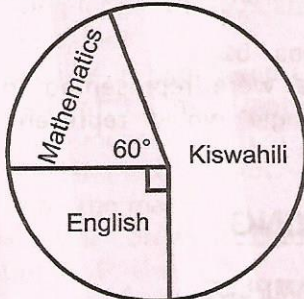
There are 240 poultry animals. What is the total number of cows and pigs ?

Poultry + cows + chicken = 290° , Pigs = 70°
(i.e $360 - 290$)

$$\begin{aligned} \text{Cows} + \text{Pigs} &= 150^\circ \\ 90^\circ &= 240^\circ \\ 150^\circ &= ? \\ \underline{150 \times 240} &= 400 \\ 90 \end{aligned}$$

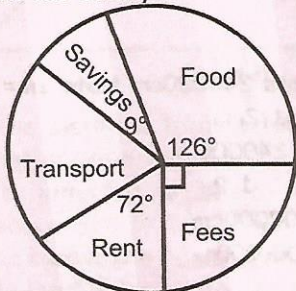
QUESTIONS ON THE TOPIC

1. Pupils in a school chose their favourite subjects among Mathematics, Kiswahili and English. The information was represented on a pie chart as shown below.



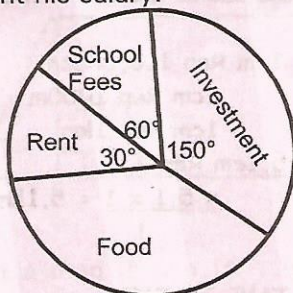
If 140 pupils chose Kiswahili, how many more pupils chose Kiswahili than English?

2. The pie-chart below shows how Kimotho spent his salary.



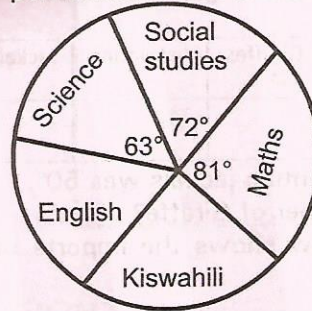
How much more did he spend on food than on fees if he spent sh. 1,568 on transport?

3. The pie chart below shows how Mohemba spent his salary.



How much more did he spend on food than on school fees if he spent sh. 9,600 on investment?

4. The pie chart below shows how Kapten performed in his end of term exams.



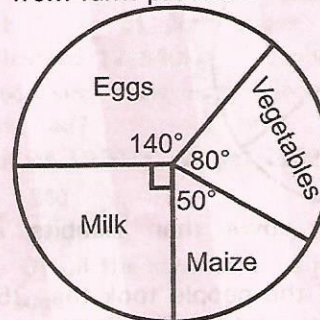
Chopi scored an average of 80% in that examination. What was the percentage scored in Mathematics?

5. The table below shows Ambwere's income from his businesses during one year. The income from his taxi business is not given.

Type of business	Farming	Taxi	House rent	Furniture workshop
Income	Sh. 90,000		Sh. 75,000	Sh. 45,000

A pie chart was drawn to represent the information above. If the angle representing the income from furniture workshop was 60° , what was the income got from the taxi-business?

6. The pie chart below shows income obtained from farm produce.



If the farmer had an income of sh. 16,200 altogether, which one of the tables below represents the information obtained from the pie chart above?

	A	B	C	D
Eggs	Sh.6,300	Sh.6,300	Sh.5,300	Sh.6,300
Vegetables	Sh.3,600	Sh.5,600	Sh.4,600	Sh.3,600
Maize	Sh.3,250	Sh.2,250	Sh.2,250	Sh.2,250
Milk	Sh.3,050	Sh.2,050	Sh.4,050	Sh.4,050

7. The table below shows the number of vehicles imported by a car dealer during one year. The information on the number of Isuzu's imported is not given.

Type of car	Nissan	Ford	Toyotas	Isuzus	Mitsubishi
No. of imported	360	160	400		240

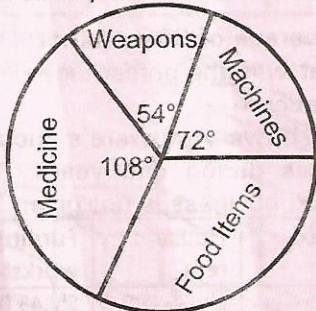
A pie chart was drawn to represent the information above. If the angle representing the number of Fords imported was 40° , what was the number of Isuzu's imported?

8. The table below shows the number of animals in a park. The number of giraffes is not given.

Type of Animals	Monkeys	Giraffes	Antelopes	Jackals
No. of Animals	962		740	370

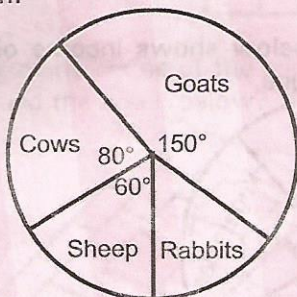
If the angle representing jackals was 50° , what was the number of Giraffe?

9. The pie chart below shows the imports of a country in 2006.



By what percentage is the import of medicine greater than that of machines?

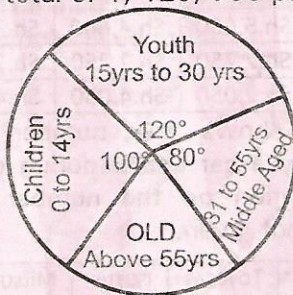
10. The pie chart below shows the number of animals in a farm. There are 270 goats in the farm.



How many more cows than Rabbits are there?

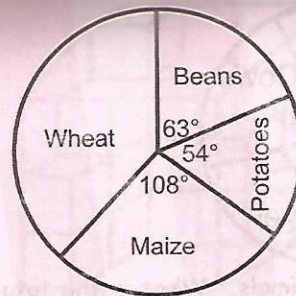
11. In a party 10% of the people took tea, 25% took Cocoa, 45% took Coffee, 5% took porridge and the rest took fruit juice. What angle would represent those who took fruit juice and porridge on a pie chart?

12. The pie chart below shows the population distribution in a certain province which had a total of 1, 125, 756 people.



How many more children than the old are in the province?

13. A farmer obtained income from the sale of his farm outputs as shown in the circle graph below.



If the farmer obtained sh. 36,000 from the sale of potatoes, what was the income from wheat?

14. In a car park, $\frac{1}{4}$ of the cars are blue, $\frac{2}{5}$ are white and $\frac{1}{3}$ of the remainder are Red and the rest are yellow. If a pie chart was to be drawn to present this information, which angle would represent the number of yellow cars?

15. Ann scored the following marks;

Mathematics	72
English	64
Kiswahili	56
Science	44
Social studies	52

If these marks were represented in a pie chart, what angle would represent Social studies?

SCALE DRAWING

WORKED OUT EXAMPLES

Example 1:

A length of 1.2cm on a scale drawing represents an actual length of 2400m. What is the scale used?

Solution:

Harmonize the units.

Thus 1.2cm represents 240000cm Note 1m=100cm

Divide both sides by 1.2cm

$$\frac{1.2\text{cm}}{1.2\text{cm}} = \frac{240000}{1.2}$$

$$1\text{cm} = 200000\text{cm}$$

$$\text{Hence } 1:200,000$$

Example 2:

A railway line is represented by a length of 5.1cm on a map. What is the actual length of the railway line in kilometres if the scales used is 1:100,000.

Solutions:

Interprets the scale 1cm Rep 100,000cm

$$1\text{cm Rep } 1000\text{m}$$

$$1\text{cm Rep } 1\text{km}$$

If 1cm Rep 1km

5.1cm Rep ?

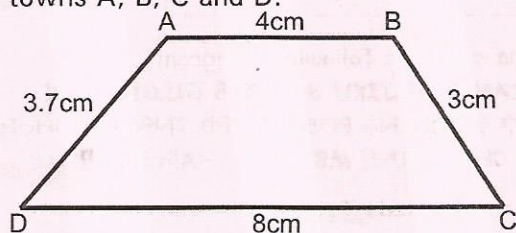
$$= \frac{5.1 \times 1}{1} = 5.1\text{km}$$

1

QUESTIONS ON THE TOPIC

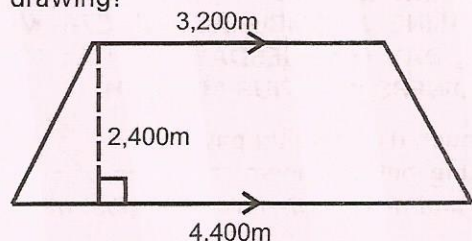
1. A map is drawn on a scale of 1:100,000. A rectangular region on a map measures 4cm by 5cm. What is the area of the region in hectares?

- The distance between town A and town B on a map is 8cm. If the actual distance is 48km, what is the scale on the map?
- A map is drawn to a scale of 1:60,000. What is the distance in kilometres, of a river which is 18cm on the map?
- On a map, a rectangular plot of land measures 12cm by 8cm. If the scale of the map is 1:1000, what is the actual area of the plot of land in ares?
- Nairobi is 500km from Mombasa by air. On a map they are $4\frac{1}{6}$ cm apart. What is the scale used?
- A triangular field with a base length of 960m and a height of 500m is to be represented on a scale drawing using the scale 1:50,000. What is the area of the scale drawing in square centimetres?
- A length of 7.2cm on a scale drawing represents an actual length of 3600m. What is the scale used?
- The scale on a map is 1:30,000. What is the drawing length of a square plot whose area is 36 hectares?
- A distance of 8km is represented on a map by a length of 3.2cm. What is the scale used?
- A road measuring 5cm on a map has an actual length of 15km. What is the scale used on the map?
- The scale drawing below represents four towns A, B, C and D.

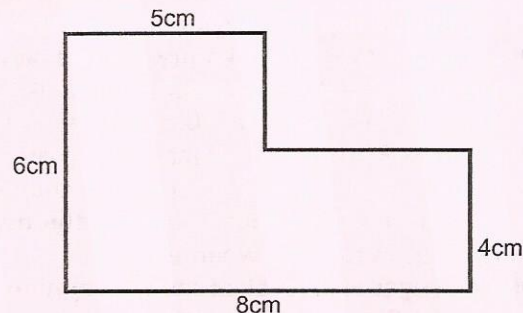


If the distance from D to B via A is 42.35km, what is the scale used?

- The area on a scale drawing of a game reserve is 4.5cm^2 . What is the actual area in hectares if the scale used is 1:400,000?
- The land below is to be represented in a scale drawing using a scale 1:80,000. What is the area in square centimetres of the scale drawing?



- On a map drawn to a scale of 1:6000 is a square field of side 6cm. What is the actual area in hectares?
- The diagram below represents a piece of land drawn using the scale 1:5000. What is the area of the plot in hectares?



WEIGHT

WORKED OUT EXAMPLES

Example 1:

1000kg of coffee were packed in 250g packets. How many packets were obtained?

$$1\text{kg} = 1000\text{g}$$

$$1000\text{kg} = ?$$

$$\text{Weight in grams} = \frac{1000\text{kg} \times 1000\text{g}}{250\text{g}} = 100,000\text{g}$$

$$\begin{aligned} \text{No. of packets} &= \frac{1,000,000\text{g}}{250} \\ &= 4,000 \text{ packets} \end{aligned}$$

Example 2:

In a factory 1000kg of sugarcane is processed to get 250kg of pure sugar. In one month a farm delivered 12,640kg of sugarcane to a factory for processing. How many kilograms of pure sugar were obtained?

Out of 1000kg, we get 250kg of pure sugar

$$\text{i.e. } \frac{250}{1000} \text{ or } \frac{1}{4}$$

\therefore Of all the sugarcane delivered, $\frac{1}{4}$ becomes pure sugar.

$$\therefore \frac{1}{4} \times 12,640\text{kg} = 3,160\text{kg pure sugar obtained.}$$

QUESTIONS ON THE TOPIC

- How many 1,250g packets can be obtained from 12 tonnes?
- A lorry has a mass of 8.5tonnes when loaded with 80 bags of wheat. There are 48 bags each with a mass of 75kg and the rest have mass of 55kg each. What is the mass of the lorry in tonnes when empty?
- A lorry whose mass is eight tonnes when empty was loaded with 80 bags of wheat each weighing 100kg and 15 bags of salt each weighing 50kg. What was the total mass, in tonnes of the loaded lorry?
- Sugar weighing 250kg was packed into 125g satchets. How many satchets were there?
- A pick-up has a mass of 3.5 tonnes when loaded with equal number of 12kg and 8kg cartons of cooking fat. If the empty pick-up has a mass of 1.5 tonnes. How many cartons were packed in the pick up?
- A trader sold $4\frac{1}{4}$ tonnes of rice in 5kg packets. How many packets were sold?

7. A box containing 20 books has a mass of 10kg. If the box when empty weighs 400g, what is the weight in grams of each book?
8. A lorry has a mass of 10.5 tonnes when loaded with 90 bags of sugar. There are 50 bags each with mass of 75kg and the rest have mass of 100kg each. What is the mass of the lorry, in tonnes, when empty?
9. 30kg of sugar was packed into equal number of 3kg and 2kg packets. How many packets altogether were packed?
10. A lorry whose mass is 7.5 tonnes when empty was loaded with 50 bags of cement each weighing 50kg and $1\frac{3}{4}$ tonnes of steel. What was the total mass in tonnes of the loaded lorry?
11. A shopkeeper had sugar packed as follows:
120 packets of 3kg each
50 packets of 2kg each
80 packets of 250g each
90 packets of 500g each
He repacked the sugar into $2\frac{1}{2}$ kg packets. How many $2\frac{1}{2}$ kg packets did he have?
12. A pick up whose mass is 1.5 tonnes when empty was loaded with 25 bags of cement each weighing 50kg and ten bags of rice each weighing 25kg. What was the total mass in tonnes of the loaded pick up?
13. A miller sold 3.9 tonnes of maize flour in 2kg packets. How many packets were sold?
14. A lorry was loaded with 6 tonnes of sugar which was packed in 250g, 500g and 1kg packets. The number of 250g was 10,000 while the number of 1kg packets was 1,500. What was the number of 500g packets?
15. A Cart was used to transport the following food items to the market:
4 bags of Cabbages each weighing 75kg
13 bags of Onions each weighing 30kg
6 bags of Carrots each weighing 80kg
5 bags of Potatoes each weighing 105kg
What was the weight of the items in tonnes?

POSTAL CHARGES

WORKED OUT EXAMPLES

The table below shows the rates of sending letters and postcards through post office.

Types of article and maximum weight		sh.	cts.
LETTERS (Limit of weight) 2 Kg	Not over 20g	6	00
	Not over 50g	7	00
	Not over 100g	8	00
	Not over 250g	12	00
	Not over 500g	20	00

	Not over 1000g	32	00
	Not over 2 kg	47	00
POSTCARDS (Single cards)		4	50

Example 1:

Oparanya sent the following letters and postcards:

Two letters weighing 56 grams each.

Three letters weighing 300g each.

1 letter weighing 1.5 kg

5 postcards.

How much did he pay for postage?

$$2 \text{ letters } 56\text{g each} \rightarrow 2 \times 8 = \text{sh. } 16$$

$$3 \text{ letters } 300\text{g each} \rightarrow 3 \times 20 = \text{sh. } 60$$

$$1 \text{ letter } 1.5 \text{ kg} \rightarrow 1 \times 47 = \text{sh. } 47$$

$$5 \text{ postcards } 5\text{x} \rightarrow 5 \times 4.50 = \text{sh. } 22.50$$

$$\text{sh. } 145.50$$

Example 2:

The table below shows part of the postal charges for sending a telegram.

No. of words	Amount in sh.	Commission rate in	
		Sh.	cts
10 or less	10	1	80
11	11	2	00
12	12	2	20
13	13	2	40
14	14	2	50
15	15	2	70
16	16	2	90
17	17	3	10

Mbugua sent the following telegram:

MIRIAM WANJIKU BOX 518 GILGIL SEND
NIMO WEDDING POSTPONED INFORM SHEILA
AND CHRISTINE MBUGUA CHARLES

15 words used. Total cost = Amount +
Commission

$$= 15 + 2.70$$

$$= \text{sh. } 17.70$$

QUESTIONS ON THE TOPIC

1. The telegram charges were sh. 22.75 for the first 10 words. Every word after 10 words cost Sh. 2.45cts. The total amount was then rounded off to the nearest fifty cents.

Mureithi sent the following telegram.

MAGDALINE NYAMBURA BOX 676 MERU
BURIAL DAY ON TUESDAY 13TH AT NOON
NO FLOWERS IGNATIUS MUREITHI

How much did Mureithi pay for it?

2. The table below shows the rates of sending letters and post cards through a post office.

Type of Article	Weight steps	Countries within East African Zone		Countries within the rest of Africa zone		Countries within Europe, Middle East & Near East		Australia, America and Far East Zone	
		Sh	cts	Sh	cts	Sh	cts	Sh	cts
Letters (Maximum weight 2kg)	Up to 20g	20	00	23	00	25	00	30	00
	Over 20g to 100g	40	00	45	00	50	00	65	00
	Over 100g to 250g	77	00	80	00	90	00	115	00
	Over 250g to 500g	120	00	140	00	160	00	205	00
	Over 500g to 1kg	200	00	233	00	265	00	340	00
	Over 1kg to 2kg	325	00	380	00	430	00	549	00
Post cards	Standard size	10	00	10	00	13	00	18	00
	Large size	20	00	23	00	25	00	35	00

Kazungu sent the following letters and postcards. Three letters each weighing 101g; One to Ethiopia and two to America. Two letters each weighing 400g; one to Nigeria and the other to Middle East. Three large postcards; one to Uganda, one to Europe and

one to Australia. How much did he pay for postage altogether?

3. The table below shows the rates of sending letters and printed papers through a post office.

Type of Article	Weight steps	East African Zone		The rest of Africa zone		Europe, Middle East & Near East		Australia, America and Far East Zone	
		Sh	cts	Sh	cts	Sh	cts	Sh	cts
Letters (Maximum weight 2kg)	Up to 20g	48	00	53	00	58	00	68	00
	Over 20g to 100g	96	00	106	00	116	00	146	00
	Over 100g to 250g	162	00	187	00	207	00	257	00
	Over 250g to 500g	288	00	328	00	368	00	458	00
	Over 500g to 1kg	480	00	545	00	610	00	860	00
	Over 1kg to 2kg	780	00	890	00	990	00	1225	00
Printed papers	Not over 1kg	500	00	550	00	590	00	650	00
	Not over 2kg	700	00	760	00	850	00	1050	00
Limit upto 5kg	Each additional 1kg Or part thereof	220	00	260	00	310	00	360	00

- Anyota sent the following letters and printed papers:
- Two letters each weighing 180g; one to Egypt and another to Near East.
- Three letters each weighing 750g; one to Uganda and two to America.
- Printed papers; 3kg to Europe and 1kg to Australia.

How much did he pay for the postage altogether?

4. The table below shows the cost in shillings of sending parcels through the post office.

Weight steps	Africa	Europe/ Near East	Rest of the world
Upto 1kg	Sh. 735	Sh. 890	Sh. 950
Over 1kg to 3kg	Sh.1,130	Sh.1,250	Sh.1,335
Over 3kg to 5kg	Sh.1,490	Sh.1,600	Sh.1,800
Over 5kg to 10kg	Sh.2,165	Sh.2,240	Sh.2,635

Wekesa sent one parcel weighing 3kg to Europe and another weighing 5kg to Africa. How much did he spend?

5. The charges of sending a telegram are sh. 25 for the first ten words or less and sh. 1.20 for each extra word after ten words. A

government tax of 15% is charged on the total amount. What would be the cost of sending the following telegram? (Give your answer to the nearest ten cent).

NAOMI NDUTA BOX 306 NAIVASHA CHICKS DELIVERED SEND MONEY AND FOOD URGENTLY GRACE BOINA

6. The table below shows the cost in shillings of sending parcels through the post office.

Weight steps	Africa	Europe/ Near East	Rest of the world
Upto 1kg	Sh. 760	Sh. 960	Sh. 1,010
Over 1kg to 3kg	Sh.1,810	Sh.2,100	Sh.2,300
Over 3kg to 5kg	Sh.2,050	Sh.2,450	Sh.2,670
Over 5kg to 10kg	Sh.2,610	Sh.2,930	Sh.3,080

Tasha sent one parcel weighing 430 grams to Europe and another weighing 7½ kg to Australia. How did she spend?

7. The table below shows the postal rates for sending a money order.

Value of order (in shs.)	Commission
Not exceeding sh. 500	Sh. 42
501 – 1000	Sh. 114
1001 – 3000	Sh. 174
3001 – 5000	Sh. 209

5001 – 10000	Sh. 295
10001 – 20000	Sh. 441
20001 – 30000	Sh. 617

Asawa sent trip fee to his three children in boarding school sh. 7,450, sh. 4,550 and sh. 2,800 respectively. How much would he have saved if he had bought only one money order?

8. The table below shows commission charges for sending money by postal orders.

VALUE OF ORDER (Denomination)		Commission Charges	
Sh.	Cts	Sh.	Cts
5	00	3	00
10	00	5	00
15	00	7	00
20	00	9	00
40	00	12	00
60	00	15	00
80	00	21	00
100	00	25	00

Josphine sent sh. 280 to her son using denomination of sh. 100, 100 and 80. She also sent sh. 320 to her daughter using denomination of sh. 100, sh. 100, sh. 80 and sh. 40. How much more commission did she pay for the daughters' postal order than for the son.

9. The table below shows part of the postal charges for sending a telegram.

No. of words	Amount in sh.	Commission rate in	
		Sh.	Cts
10 or less	10	1	80
11	11	2	00
12	12	2	40
13	13	2	60
14	14	2	90
15	15	3	10
16	16	3	50
17	17	3	80

Omtata sent the following telegram;

MILLENIUM AMWERE BOX 60851
KAKAMEGA COLLEGE OPENS 13TH MAY
PAY WITH BANKERS CHEQUE PHILIP
OMTATA

How much did he pay for the telegram?

10. The telegram charges were sh. 15.50 for the first 10 words. Every additional word was charged sh. 2.40. The total amount was then rounded up to the nearest fifty cents. Mwangangi sent the following telegram..

GEORGE MATATA BOX 6394 MACHAKOS
GO VISIT WAIRIMU BOARDING SCHOOL
NAIROBI 1ST SUNDAY ANN MWANGANGI

How much did she pay for the telegram?

11. The table below shows the postal rates for sending a money order.

Value of order (in shs.)	Commission
Not exceeding sh. 500	Sh. 42
501 – 1000	Sh. 114
1001 – 3000	Sh. 174
3001 – 5000	Sh. 209
5001 – 10000	Sh. 295
10001 – 20000	Sh. 441
20001 – 30000	Sh. 617

School fees for two children in the same school was sh. 8,750 and sh. 12,790. The father bought one money order to pay the total amount of fees. How much more would he have spent had he bought two separate money orders for the fees?

12. The table below shows commission charges for sending money by postal orders.

VALUE OF ORDER (Denomination)		Commission Charges	
Sh.	Cts	Sh.	Cts
5	00	1	50
10	00	2	50
15	00	4	00
20	00	4	50
40	00	6	00
60	00	6	50
80	00	7	50
100	00	10	00

Makara sent sh. 350 to her son using denomination sh. 100, sh. 100, sh. 80, sh. 60 and sh. 10. He also sent sh. 350 to her daughter using denomination sh. 100, sh. sh.100, sh. 20, sh. 15 and sh. 15. How much more commission did she pay for his daughter's postal order than for the son's?

13. The table below shows the cost in shillings of sending parcels through the post office.

PARCELS	Shs	Cts
(Limit of weight 50kg)		
Up to 5kg	68	00
Over 5kg upto 10 kg	105	00
Over 10kg upto 15kg	128	00
Over 15kg upto 20kg	143	00
For each additional 1kg or part thereof upto 50kg	15	00

Kanja sent two parcels each weighing $7\frac{1}{2}$ kg and another one weighing 17kg 370g. How much did he spend?

14. The following table shows the commission charged when one buys postal orders.

VALUE OF ORDER in shs.		Commission Charges	
Sh.	Cts	Sh.	Cts
100	00	13	00
200	00	15	00
300	00	20	00
400	00	28	00

Tirunesh wanted to send sh. 900 by postal orders. Which one of the postal order combinations given below should she buy in order to pay the least commission?
 A. Sh. 400 + sh. 400 + sh. 100
 B. Sh. 400 + sh. 300 + sh. 200

- C. Sh. 300 + sh. 300 + sh. 300
 D. Sh. 400 + sh. 200 + sh. 200 + sh. 100

15. The table below shows post office rates for sending letters, post cards and aerogrammes.

INLAND MAIL		INTERNATIONAL AIR MAIL		
		Africa	Europe	America & Far East
Not over 20g	Kshs. 12.00			
Not over 50g	Kshs. 14.00			
Not over 100g	Kshs. 16.00	Sh. 27.00	<u>Aerogrammes</u> Sh. 27.00	Sh. 27.00
Not over 250g	Kshs. 24.00		<u>Postcards</u> Sh. 25.50	
Not over 500g	Kshs. 40.00	Sh. 18.00		Sh. 33.00
Not over 1kg	Kshs. 64.00			
Not over 2kg	Kshs. 94.00			

Mbindyo sent the following mail:

- 1 letter weighing 15g
- 1 letter weighing 755g
- 1 letter weighing $1 \frac{3}{4}$ kg
- 2 postcards to Europe
- 1 postcard to America
- 1 Aerogramme to Far East

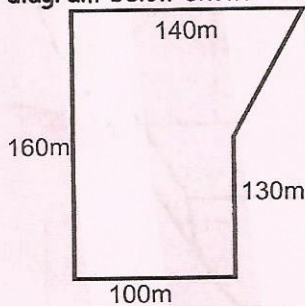
How much money did he pay for the mail?

AREA, PERIMETER AND CIRCUMFERENCE

WORKED OUT EXAMPLES

Example 1:

The diagram below shows Miriam's plot of a land.



What is the perimeter of the land?

Perimeter is the distance all round. Only one side measurement is not given. Use pythagorean theory to find length of side not given.

let the side be h. Thus $h^2 = 40^2 + 30^2$

$$h^2 = 2500$$

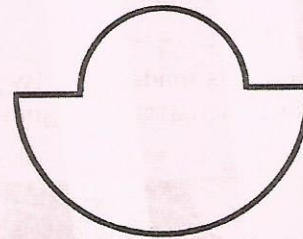
$$h = \sqrt{2500}$$

$$h = 50m$$

$$\text{Perimeter} = 160 + 140 + 50 + 130 + 100 = 580m$$

Example 2:

The figure below represents a plot bound by two straight edges and two semi-circle of diameter 14m and 28meters.



What is the area of the plot? (Take $\pi = \frac{22}{7}$)

Find the area of the two semi-circles

$$A = \frac{1}{2} \pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 = 77m^2$$

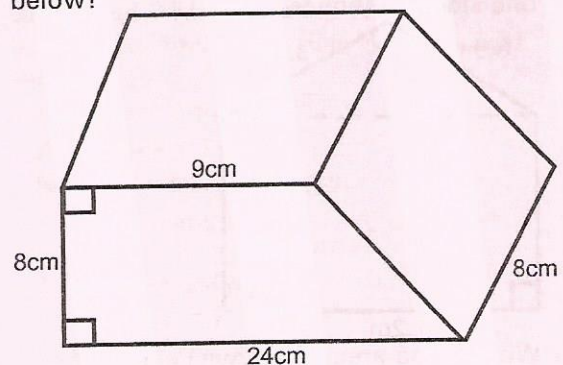
(smaller semi circle)

$$A = \frac{1}{2} \pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 14 \times 14 = 308m^2$$

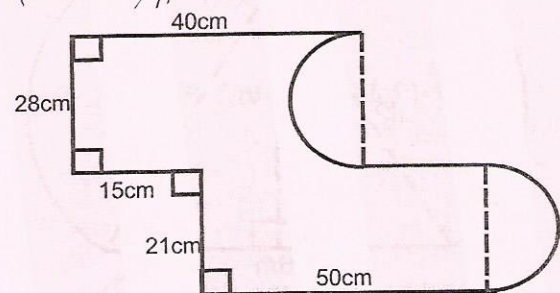
$$\text{Total area} = 77m^2 + 308m^2 = 385m^2$$

QUESTIONS ON THE TOPIC

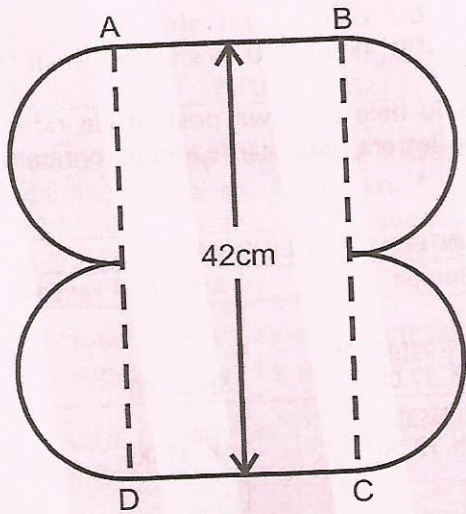
1. What is the total surface area of the solid below?



2. What is the perimeter of the figure below? (Take $\pi = \frac{22}{7}$)

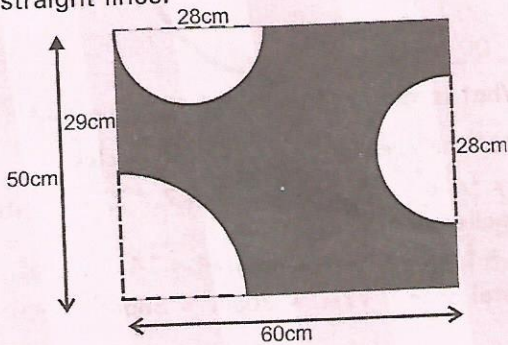


3. In the figure below the rectangle ABCD measures 15cm by 42cm. The figure also has four equal semi-circles.

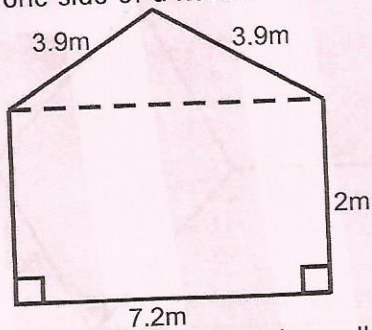


What is the area of the figure in cm^2 ?
(Take $\pi = \frac{22}{7}$)

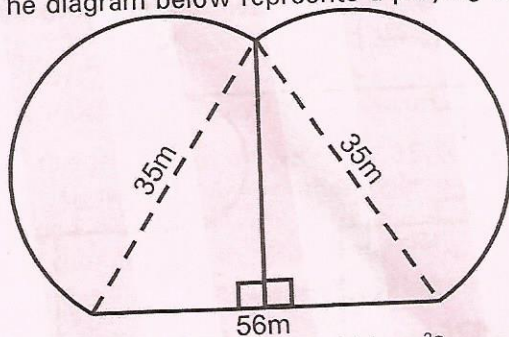
4. The figure below is made up of two semicircles and a quarter circle joined by straight lines.



5. What is the perimeter of the figure?
The diagram below represents the wall of one side of a house.

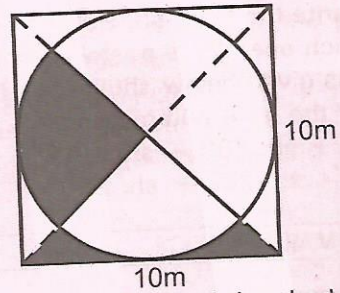


6. What is the area of the wall shown?
The diagram below represents a playing field.



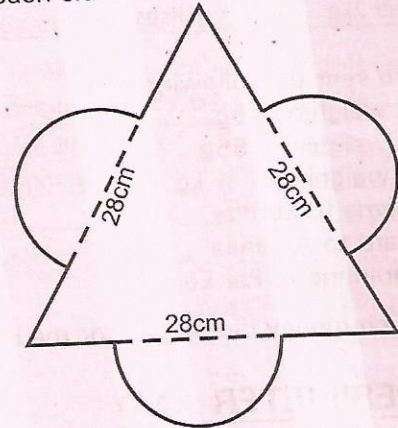
What is the area of the field in m^2 ?
(Take $\pi = \frac{22}{7}$)

7. The diagram below represents a circle of radius 10cm



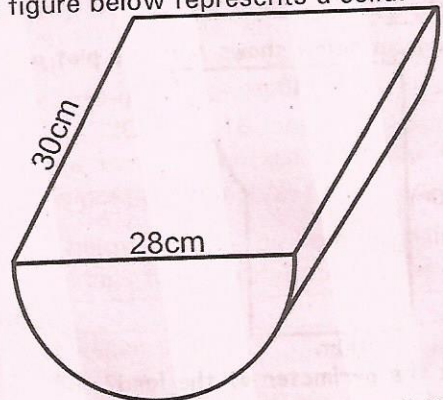
What is the area of the shaded part?
(Take $\pi = \frac{22}{7}$)

8. The diagram below represents an equilateral triangle of side 36cm. It has three equal semicircles each of diameter 28cm attached to each side.



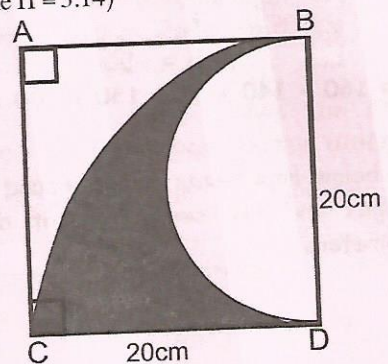
What is the perimeter of the figure?
(Take $\pi = \frac{22}{7}$)

9. The figure below represents a solid.

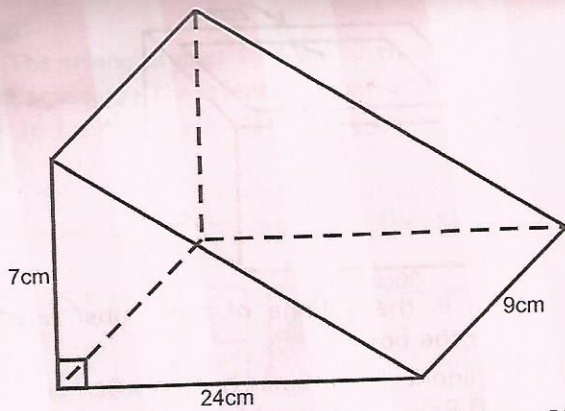


What is the surface area of the solid?
(Take $\pi = \frac{22}{7}$)

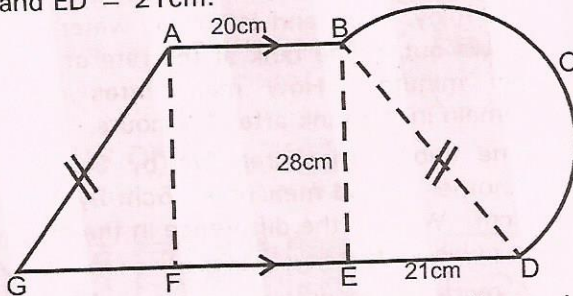
10. The given figure ABCD is a square of side 20cm. Find the area of the shaded part.
(Take $\pi = 3.14$)



11. Below is a triangular prism. Find the surface area of the prism.

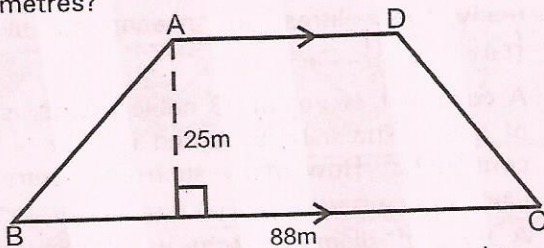


12. In the figure below, AB is parallel to GD. Line AG = BD. AB = 20cm BE = 28cm and ED = 21cm.

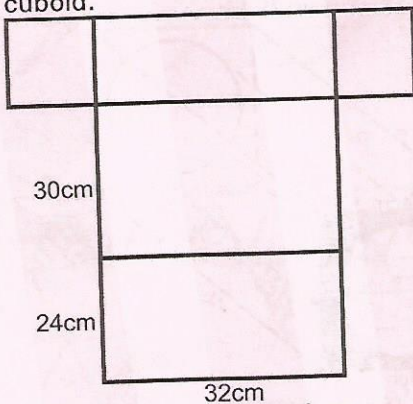


What is the perimeter of the figure in centimetres? (Take $\pi = \frac{22}{7}$)

13. The area of the trapezium drawn below is $16\frac{1}{4}$ ares. The length of BC = 88m and height is 25m. What is the length of AD in metres?

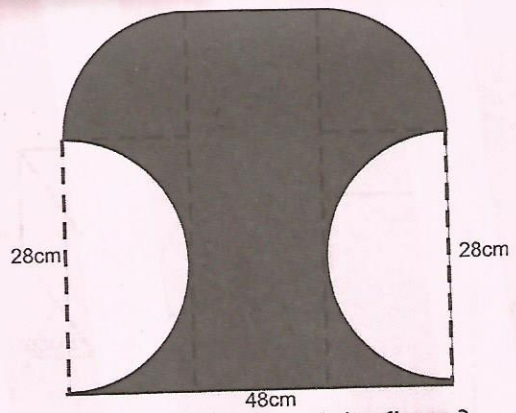


14. The net below is of an open rectangular cuboid.



What is the area in cm^2 of the net?

15. The figure below is made up of two quarter circles and two semicircles joined together by two straight lines.



What is the perimeter of the figure?
(Take $\pi = \frac{22}{7}$)

VOLUME AND CAPACITY

WORKED OUT EXAMPLES

Example 1:

A rectangle container holds 105 Litres of water when full. The base of the container is 70cm long and 50cm wide. What is the height of the container in centimeters?

$$\begin{aligned} 1 \text{ Litre} &= 1000\text{cm}^3 \\ \therefore 105\text{L} &= ? \quad \text{Volume} = 105\text{L} \times 1000\text{cm}^3 \\ &= 105,000\text{cm}^3 \end{aligned}$$

$$\begin{aligned} \text{height} &= \frac{\text{Volume}}{\text{Base area}} \\ &= \frac{105,000\text{cm}^3}{70 \times 50} \\ &= 30\text{cm} \end{aligned}$$

Example 2:

A shopkeeper bought 20 cartons of fruit juices. A carton had 24 bottles each of 250ml.

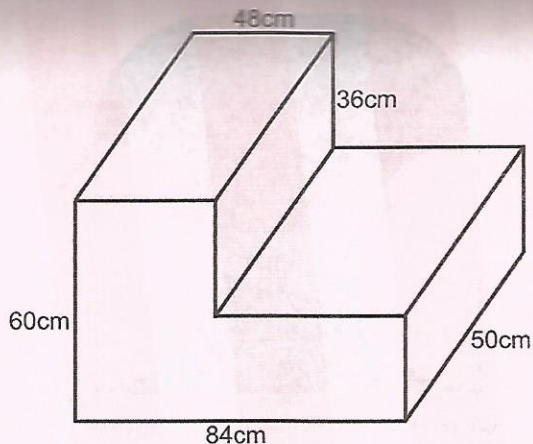
How many litres of milk were bought by the shopkeeper?

$$\begin{aligned} 1 \text{ carton} &= 24 \text{ bottles} \\ 20 \text{ cartons} &= ? \\ \text{No. of bottles} &= \frac{20 \times 24}{1} \\ &= 480 \text{ bottles} \end{aligned}$$

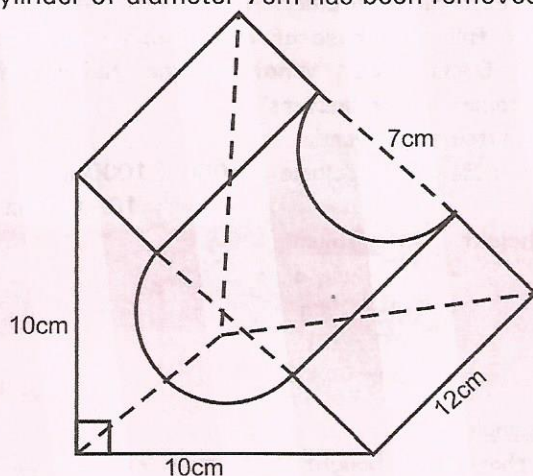
$$\begin{aligned} 1 \text{ bottles} &= 250\text{ml} \\ 480 \text{ bottles} &= ? \\ \text{Capacity} &= \frac{480 \times 250\text{ml}}{1} \\ &= \frac{120,000\text{ml}}{1000} \quad \text{Note 1 Litre} = 1000\text{ml} \\ &= 120\text{L} \end{aligned}$$

QUESTIONS ON THE TOPIC

1. What is the volume of the figure below?

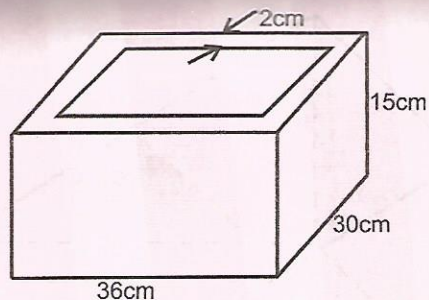


- A cylinder has a volume of 83.16m^3 if the height of the cylinder is 6m, what is its diameter? (Take $\pi = \frac{22}{7}$)
- The diagram below represents a solid made up of a triangular prism from which half cylinder of diameter 7cm has been removed.



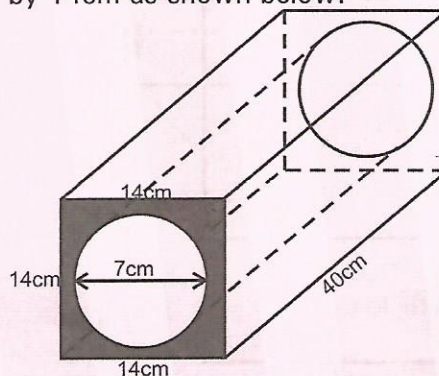
What is the volume?

- What is the height of a cylindrical tank whose volume is 41.58m^3 and radius 2.1m? (Take $\pi = \frac{22}{7}$)
- The surface area of a closed cylinder is 836cm^2 . If the radius of the cylinder is 7cm, what is the volume of the cylinder? (Take $\pi = \frac{22}{7}$)
- A rectangular container 40cm long and 30cm wide is full of water. After removing 9.6 litres of water the level of water became 10cm. What was the height of the container?
- A rectangular container holds 12.6 litres of liquid when full. The base of the container is 35cm long and 24cm wide. What is the height of the container in centimetres?
- The diagram below shows an open rectangular box made of timber. The external measurements of the box are 36cm by 30cm by 15cm. the thickness of the timber is 2cm.



What is the volume of the timber used to make the box?

- A cylindrical container has an internal radius of 10.5cm and a height of 24cm. what is its capacity in litres?
- A rectangular container measures 2m by 1.8m by 1.5m and is full of water. Water flows out of the tank at the rate of 15 litres per minute. How many litres of water remain in the tank after $1\frac{1}{4}$ hours.
- One cuboid measures 3m by 5m by 4m. Another cuboid measures 15cm by 12cm by 8cm. What is the difference in their volumes in cubic metres?
- A rectangular container has a square base of sides 80cm. Its height is 150cm. How many litres of water does it hold when half full?
- A cylindrical tank of diameter 2.1m and a height of 1.8m is $\frac{2}{3}$ full of water. How many more litres are needed to fill it? (Take $\pi = \frac{22}{7}$)
- A container of volume 3 cubic metres is full of milk. The milk is poured into 25 - litre containers. How many such containers are used?
- A hole of diameter 7cm was drilled in a wooded block that measured 40cm by 14cm by 14cm as shown below.

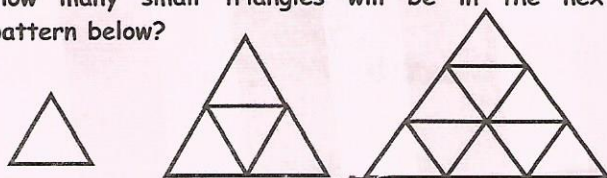


What was the volume of the remaining wood? (Take $\pi = \frac{22}{7}$)

GEOMETRY – PATTERNS

Example 1:

How many small triangles will be in the next pattern below?

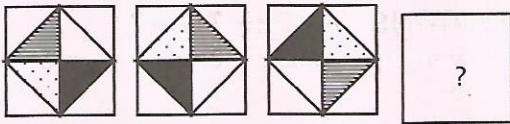


Solution:

Note: The triangles are: 1, 4 and 9 these are perfect squares. Therefore, number of triangles will be 16 i.e 4^2 answer = 16 triangles.

Example 2:

Which shape should be drawn in the blank box below?



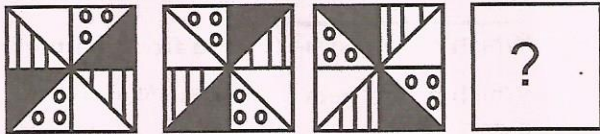
Note: The next pattern is obtained by moving the immediate pattern in a clockwise direction at an angle of 90° .

Therefore, the next pattern will be

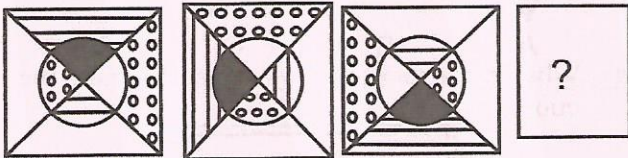


QUESTIONS ON THE TOPIC

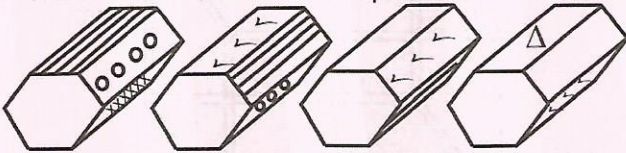
1. Which shape should be drawn in the blank box below?



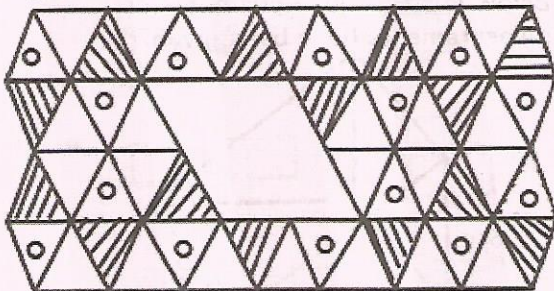
2. Which one of the following shapes should be drawn in the blank box to continue the pattern below?



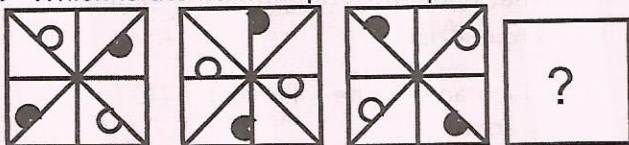
3. What will be the next fifth pattern?



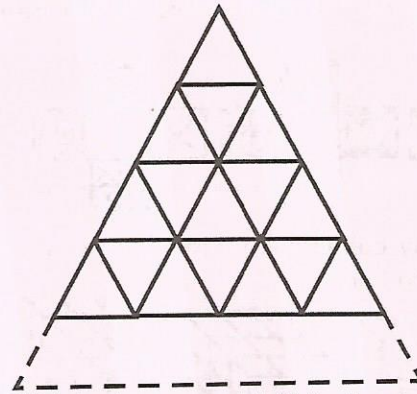
4. Which shape will complete the pattern below?



5. Which is the next shape in the pattern?

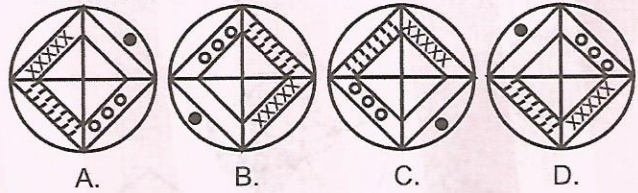


6.

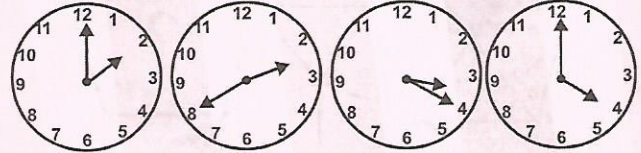


Which shape would fit in the dotted space in the pattern above?

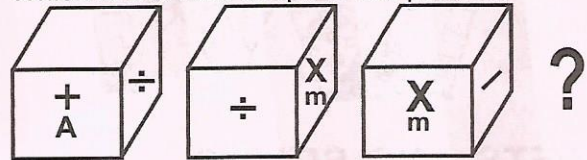
7. Which of the shapes below is different from the others?



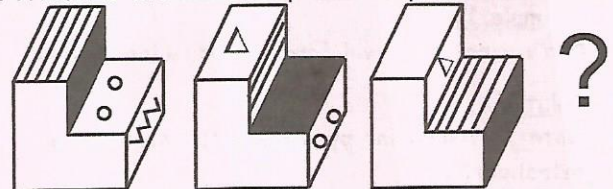
8. What comes next in the pattern of clocks?



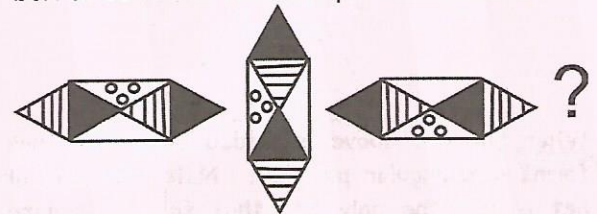
9. Which is the next shape in the pattern?



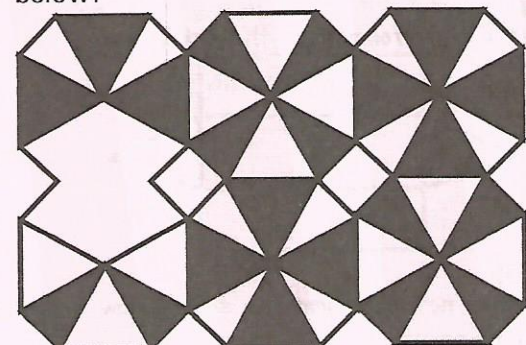
10. Which is the next shape in the pattern?



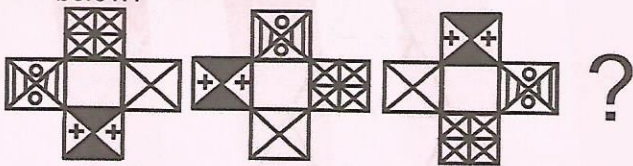
11. Which shape should be drawn in the blank box to continue with the pattern below?



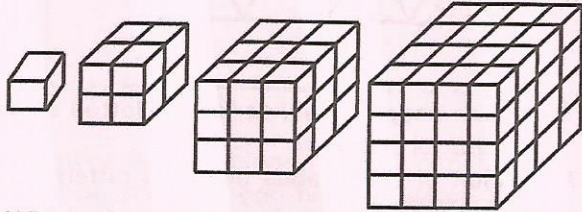
12. Which shape will complete the pattern below?



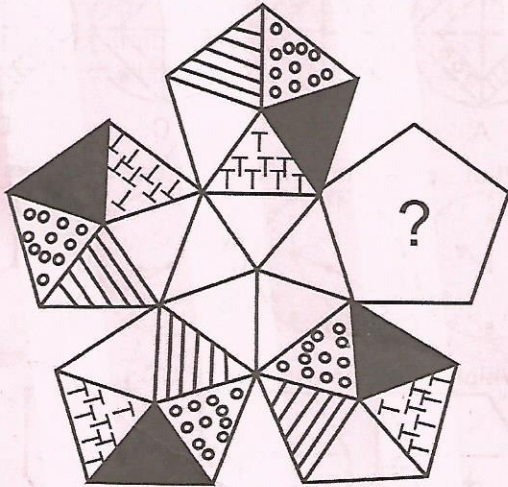
13. What will be the next shape in the pattern below?



14. How many cubes will be in the next stack in the pattern below?



15. Which shape will complete the pattern below?



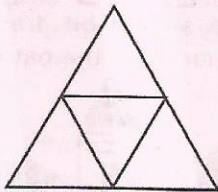
NETS AND SOLIDS

Example 1:

Draw a net that will form a triangular pyramid.

Solution:

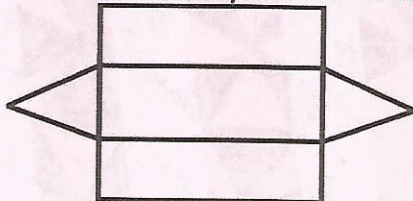
Note: A triangular pyramid is the same as a tetrahedron.



When the net above is folded along the lines, it forms a triangular pyramid. Note that the above net is not the only net that forms a triangular pyramid.

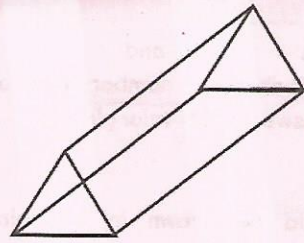
Example 2:

Draw the solid formed by the net below.



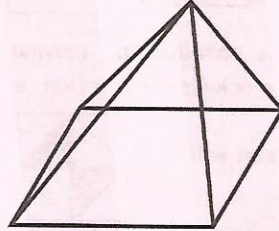
Solution:

The above net will form the solid below which is a triangular prism.

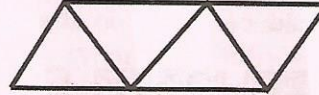


QUESTIONS ON THE TOPIC

1. How many vertices does the figure below have?

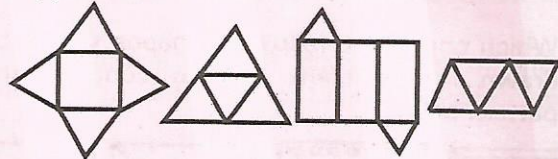


2. Below is a net of a solid.



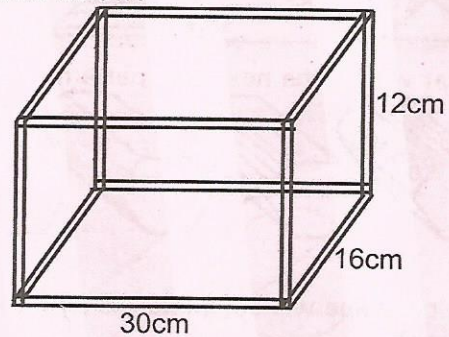
Which solid can be formed from the net?

3. Which of the nets below will NOT form a pyramid?

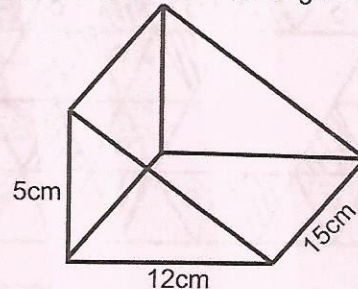


A. B. C. D.

4. What is the length of wire used to make the cuboid below?

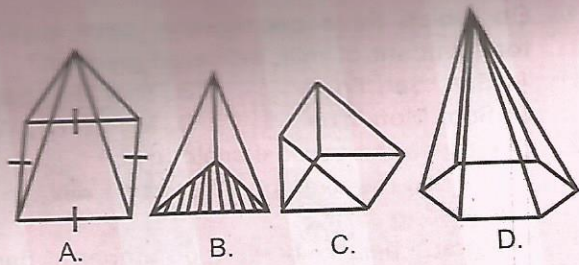


5. Below is a triangular prism whose measurements have been given.

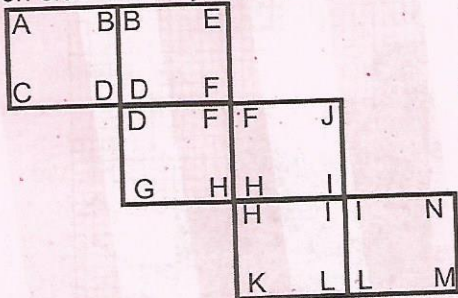


What is the total length of the edges in centimetres?

6. Which among the following is NOT a pyramid?

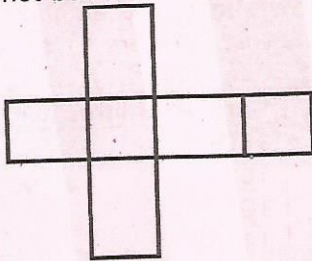


7. Below is a net of a cube. When folded, which side will be joined to side LM?

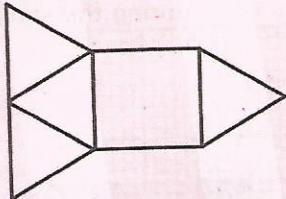


8. What is the product of the faces and edges of square based pyramid?

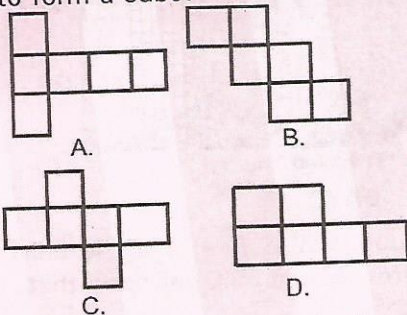
9. What name is given to the solid formed by the net below?



10. What name is given to the solid formed by the net below?



11. Which of the following nets cannot be folded to form a cube?

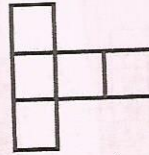


12. What is the product of the faces, edges and vertices of a triangular prism?

13. Complete the following table.

Solid	Vertices	Edges	Faces
(i) Triangular prism	_____	_____	_____
(ii) Cube	_____	_____	_____
(iii) Open cuboid	_____	_____	_____
(iv) Triangular pyramid	_____	_____	_____
(v) Square based pyramid	_____	_____	_____

14. Which solid is formed by the following net?



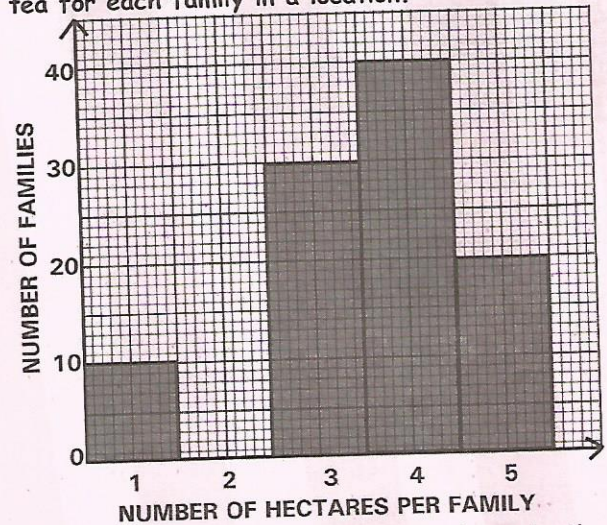
15. How many faces are there in a closed cylinder?

BAR GRAPHS

WORKED OUT EXAMPLES

Example 1:

The graph below shows the number of hectares of tea for each family in a location.



How many hectares of tea are there in the location?

Solution:

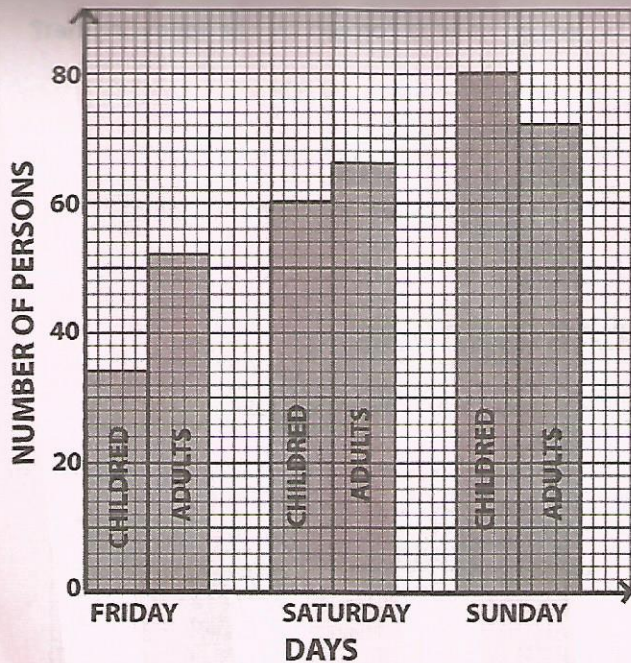
No. of families	Hectares per family	Total
10	1	$10 \times 1 = 10$ ha
0	2	$0 \times 2 = 0$ ha
30	3	$30 \times 3 = 90$ ha
40	4	$40 \times 4 = 160$ ha
20	5	$20 \times 5 = 100$ ha

Therefore the total = $10 + 0 + 90 + 160 + 100$

= 360 hectares

Example 2:

The bar graph represents the number of visitors to a game park on a Friday, a Saturday and a Sunday.



How many more adults than children visited the park during the three days?

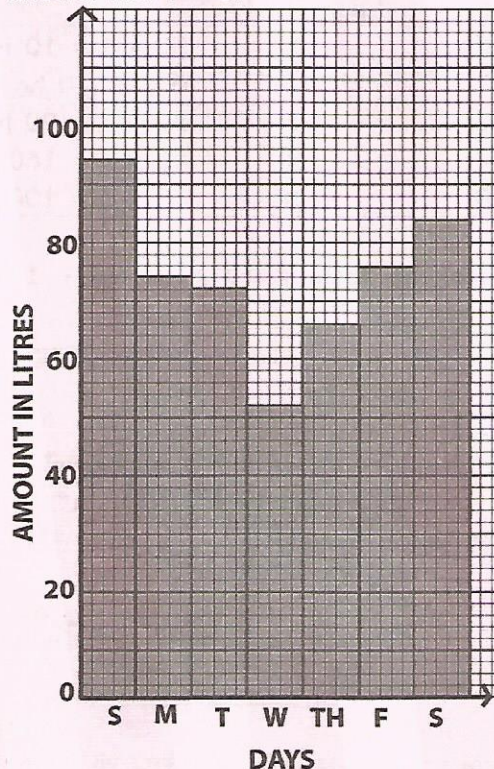
Solution:

	Children	Adults
Friday	34	52
Saturday	60	66
Sunday	80	72
	<u>174</u>	<u>190</u>

Therefore $190 - 174 = 16$ more adults

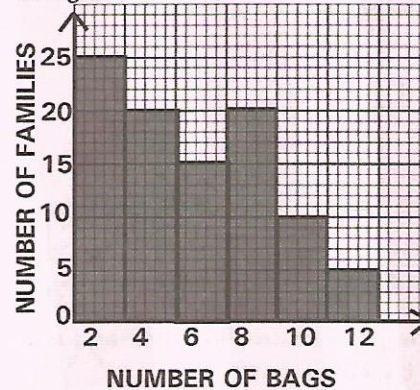
QUESTIONS ON THE TOPIC

The graph below represents weekly milk delivery records in a certain dairy. Use it to answer No. 1 – 3.



- On which three consecutive days was the total amount of milk delivered greatest?
 A. Sun, Sat, Fri B. Thur, Fri, Sat
 C. Sun, Mon, Tue D. Mon, Tue, Wed
- What was the vertical scale used?
- What was the average amount of milk delivered in a day?

The graph below shows the number of bags of maize harvested by each family in a village.

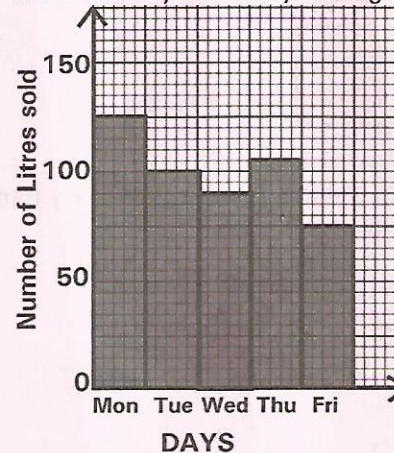


- How many bags of maize were harvested in the village?

The table below shows the number of litres of milk delivered by villagers to a dairy in 5 days.

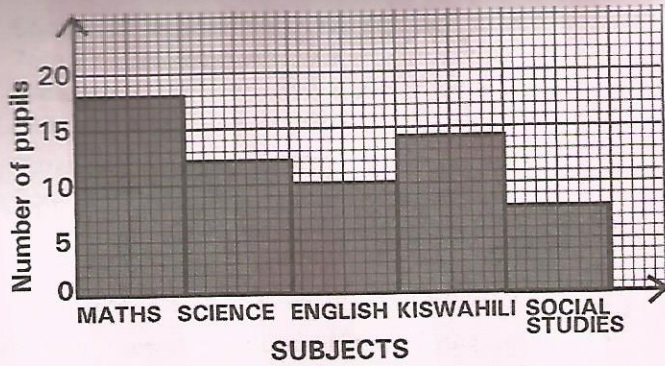
Days	Number of litres delivered
Monday	180
Tuesday	160
Wednesday	100
Thursday	140
Friday	80

The bar graph below shows the number of litres sold by the dairy during the same days.



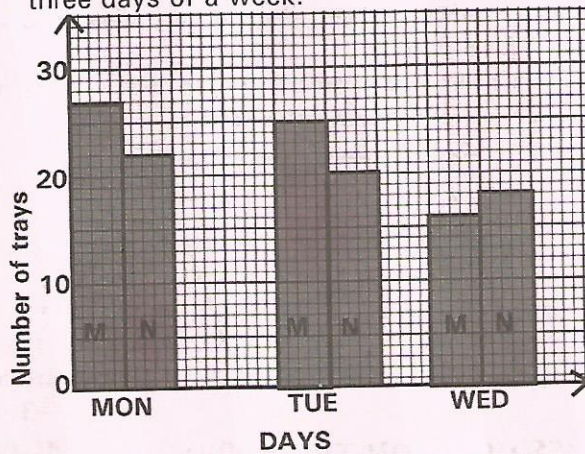
- In which day of the week did the dairy sell three quarters of the milk delivered that day?
- What was the average amount of milk sold per day that week?

Pupils in a certain class were asked to choose their favourite subjects. The bar graph shows the subjects and the number of pupils who chose those subjects.



7. How many pupils are in that class if all those who chose science also chose mathematics?

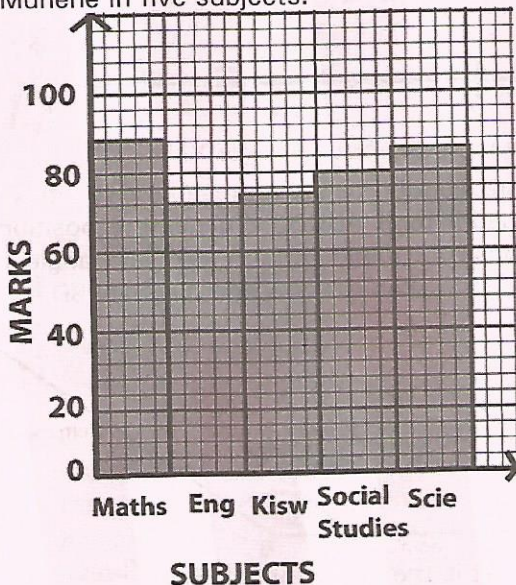
8. The bar graph below shows the number of trays of eggs sold by farmers M and N in three days of a week.



If the price of a tray of eggs was sh. 220 per tray. How much money did both farmer M and N receive?

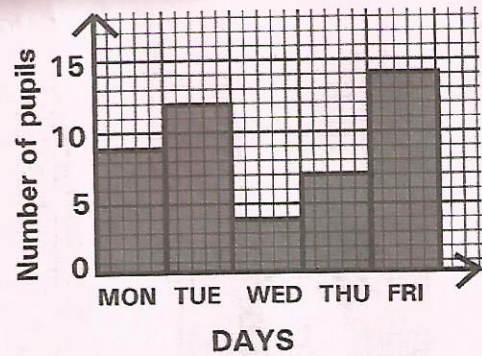
9. How much more did farmer M receive than farmer N?

10. The bar graph below shows marks scored by Munene in five subjects.



What was his mean score?

11. The bar graph below shows the number of pupils absent from school during one week.



Which one of the following tables correctly represents the information in the graph?

A.

Days of the week	Mon	Tue	Wed	Thu	Fri
No. of pupils	9	12	4	8	14

B.

Days of the week	Mon	Tue	Wed	Thu	Fri
No. of pupils	9	12	4	7	14

C.

Days of the week	Mon	Tue	Wed	Thu	Fri
No. of pupils	9	12	4	7	15

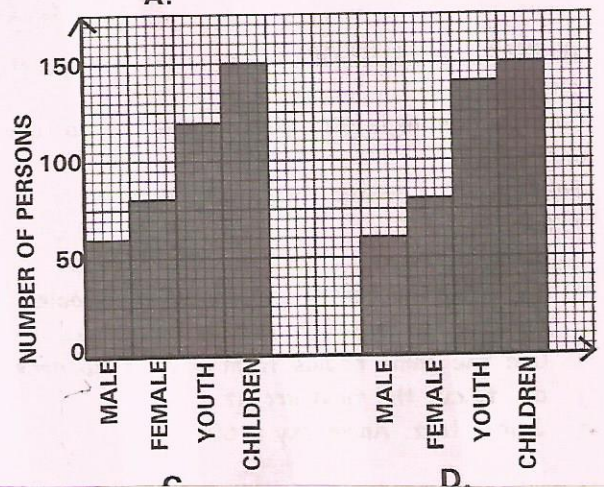
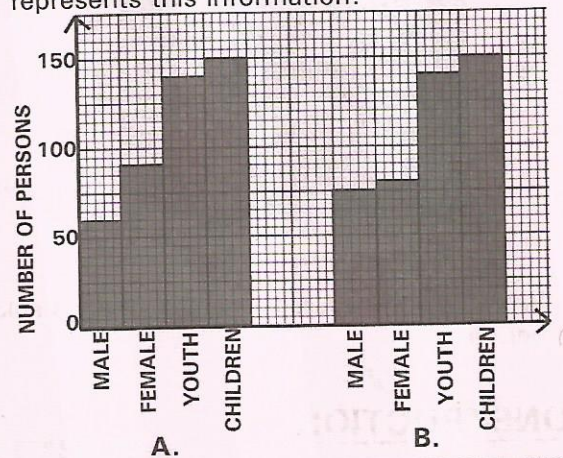
D.

Days of the week	Mon	Tue	Wed	Thu	Fri
No. of pupils	10	12	4	7	14

12. The information about the number of different worshippers in a church was recorded as follows;

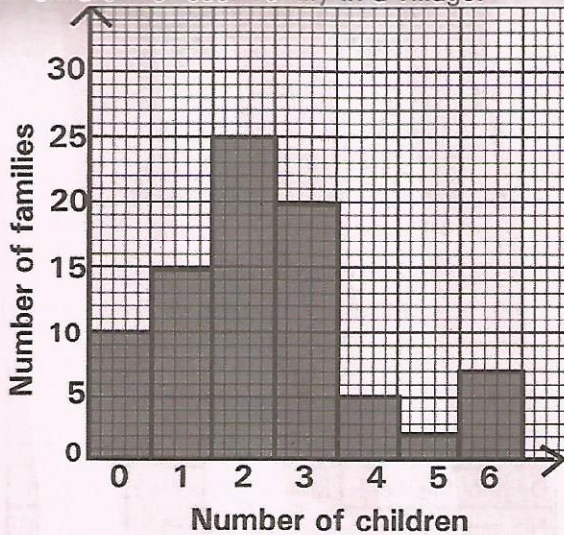
Worshippers	Male Adults	Female Adults	Youth	Children
Number of persons	60	80	140	150

Which of the following bar graphs correctly represents this information?



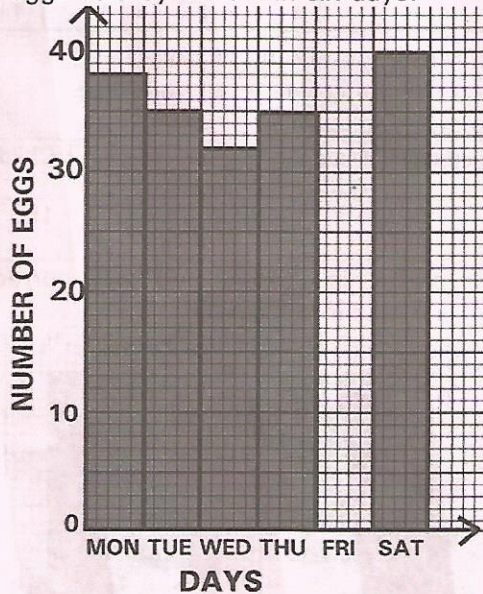
What is the value of angle ACB?

13. The graph below shows the number of children for each family in a village.



How many children are there in the village?

14. What is the modal number of children in most families?
15. The bar graph below shows the number of eggs sold by Miriam in six days.



What was the average number of eggs sold per day?

CONSTRUCTION

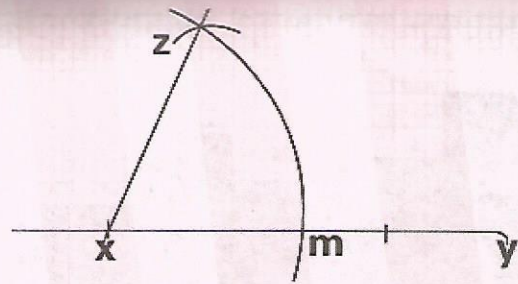
WORKED OUT EXAMPLES

Example 1:

Construction angle 60° using compasses and ruler only.

Solution: To construct angle 60° , proceed as follows:

- Draw a line xy
- Let x be the centre and choose a suitable radius draw an arc to cut line xy at m .
- Use the same radius from point m to draw an arc to cut the first arc at z .
- Join x to z . Angle $zxy = 60^\circ$

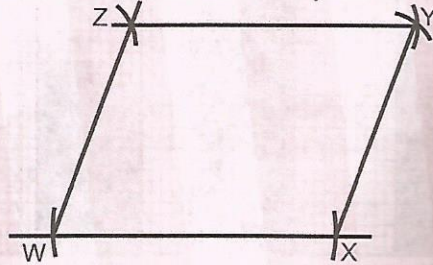


Example 2:

Construct a parallelogram given the two adjacent sides as 5cm and 7cm and the angle between them being 70° .

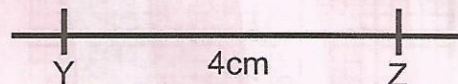
Solution: Follow the following steps.

- Label the parallelogram $wxyz$.
- Draw line $wx = 7\text{cm}$.
- Construct angle $zwx = 70^\circ$ (use a protractor).
- Using radius of 5cm, draw an arc along line wz and from point x .
- From point z use radius 7cm to draw an arc to meet the arc drawn from point x .



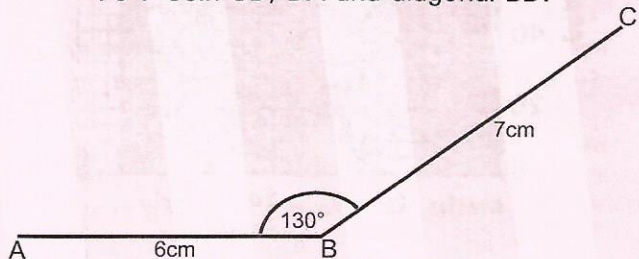
QUESTIONS ON THE TOPIC

1. Construct a rhombus ABCD of side 6cm and angle $DAB = 55^\circ$. What is the measure of the diagonal BD?
2. On the line YZ drawn below, construct XYZ such that angle XYZ is 60° and angle XZY is 30° . Bisect angle YXZ and draw the bisector to meet line YZ at M.



What is the size of angle YMX?

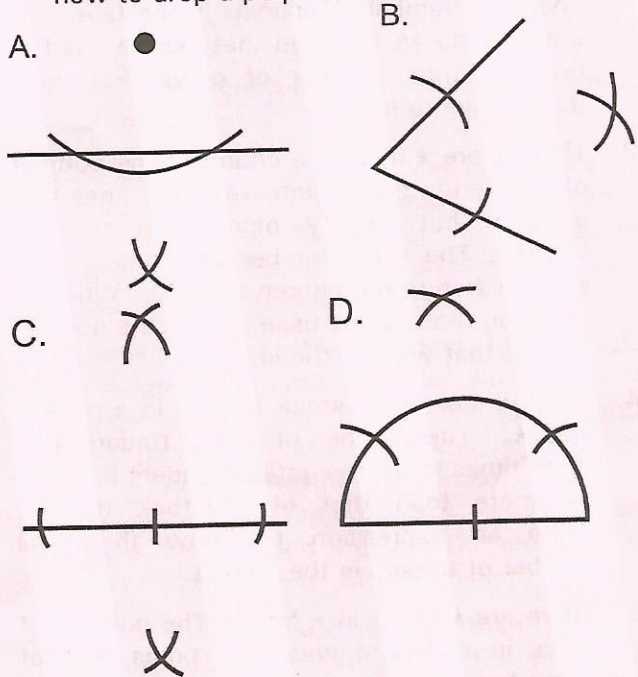
3. The diagram below represents two sides of a quadrilateral ABCD. To get the position D, construct angle $BCD = 40^\circ$ and angle $DAB = 70^\circ$. Join CD, DA and diagonal BD.



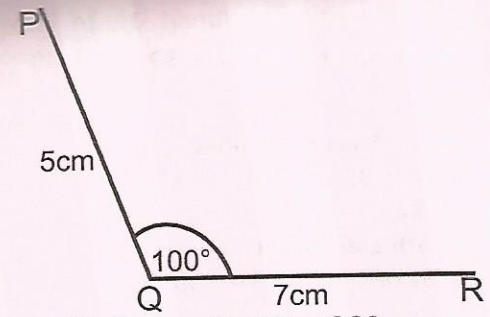
What is the length of line BD?

4. Construct a triangle ABC such that side $AB = 7\text{cm}$ and angle $ABC = 70^\circ$ and angle $BCA = 50^\circ$. What is the length of side BC?

5. Construct a triangle XYZ such that $XY = 7\text{cm}$, $YZ = 8\text{cm}$ and $XZ = 5\text{cm}$. Draw a circle that touches the sides. What is the radius of the circle drawn?
6. Construct a rhombus ABCD whose sides are 7cm and angle $ABC = 50^\circ$. Draw the diagonals. What is half of the longer diagonal?
7. Construct a triangle ABC such that $AB = BC = CA = 8\text{cm}$. Drop a perpendicular from A to meet line BC at D. Draw the bisector of angle ACB to meet line AD at E and line AB at F. Which of the following statements is WRONG from the construction?
- A. Triangle AEF = Triangle EDC.
 B. Triangle AEF and Triangle EDC are right angles triangles.
 C. Triangle AEC is an equilateral triangle.
 D. Angle FED = 120°
8. Construct a parallelogram WXYZ such that $WX = ZY = 7\text{cm}$ and $WZ = XY = 5\text{cm}$ and angle $WZY = 80^\circ$. Draw the diagonals. What is the length of the longer diagonal?
9. Construct a semi-circle whose centres is O and diameter $AOB = 8\text{cm}$. A mark point D on the curved part 3.5cm . From B mark point C on the curved part 4.5cm . Join points C to D. What is the measure of angle DCB?
10. Which one of the figure below demonstrates how to drop a perpendicular from a point?

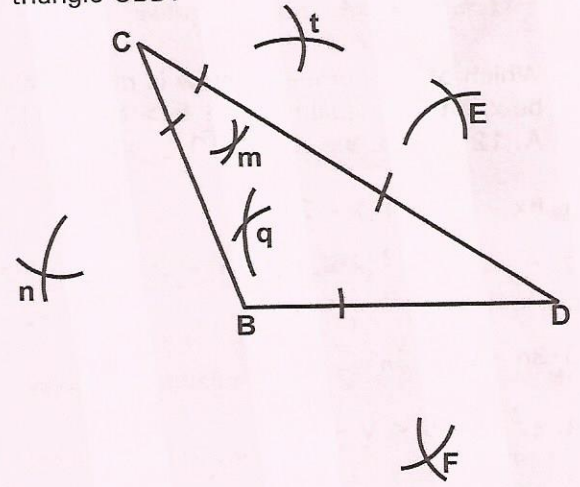


11. The diagram below represents two sides of a quadrilateral PQRS. To get position of S construct angle $QPS = 110^\circ$ and angle $QRS = 70^\circ$. Join RS, SP and diagonal SQ.



What is the length of line SQ?

12. Construct a trapezium ABCD such that line AB is parallel to line CD. Angle $ACD = CAB = 90^\circ$ and line $AC = AB = 5\text{cm}$. Angle $ABD = 120^\circ$. What is the measure of line CD?
13. Construct a triangle of sides 8cm by 8cm by 6cm . Draw a circle that touches the sides of that triangle. What is the radius of the circle?
14. Construct a semi-circle whose diameter AB is 10cm . Complete the triangle ABC in the semi circle such that $BAC = 50^\circ$ and C is on the circumference. Construct a perpendicular CD from C to AB. What is the length of CD?
15. Which pair of lines drawn through the construction marks will give the centre of the circle which touches the three vertices of triangle CBD?



ALGEBRA (Inequalities)

Example 1

What is $\frac{3}{4}x - 6 > 15$ in its simplified form?

Solution:

- Add 6 to both sides
 $\frac{3}{4}x - 6 + 6 > 15 + 6$
 $\frac{3}{4}x > 21$
- Multiply both sides by the reciprocal of $\frac{3}{4}$ which is $\frac{4}{3}$.
 $\frac{4}{3} \times \frac{3}{4}x > 21 \times \frac{4}{3}$
 $x > 28$

What is the value of angle ACB?

Example 2

What is the inequality $8p + 7 < 39$

Solution:

- Subtract 7 from both sides

$$8p + 7 < 39$$

$$8p < 32$$

- Divide both sides by 8

$$8p/8 < 32/8$$

$$= P < 4$$

QUESTIONS ON THE TOPIC

Simplify the inequalities below;

- $2\frac{1}{3}y + 5 < \frac{1}{2}y + 12\frac{2}{3}$
- $5x + 4\frac{1}{2} > 2\frac{1}{3}x + 7\frac{1}{2}$
- $5x + 4\frac{1}{2} > 1\frac{1}{3}x + 5\frac{1}{2}$
- $2(5m - 4) > 3(2m + 5)$
- $3t - 15 < 30$
- $y^2 > 324$
- $2n^2 - 28 < 100$
- $\frac{(2f-4)}{5} > \frac{(f+5)}{3}$
- $\frac{2}{3}x - 5 < \frac{3}{5}x - 2$
- Which of the numbers below is most likely to be x in the inequality $6x + 5 > 3x + 41$?
A. 12 B. 9 C. 10 D. 15
- $6x - 15 > 11x - 27$
- $\frac{3}{4}y - 8 < \frac{2}{5}y + 13$
- $3n - 5 > \frac{3}{5}n$
- $4\frac{2}{3}y + 5 < y + 11$
- $2\frac{1}{3}p < 46 + \frac{4}{3}p$

(Forming Equations)

Example 1

A book costs x shillings and y cents. Find the cost of k books.

Solution:

1 book costs = sh. x y cents

k books costs = sh ?

k books costs = $k \times (\text{sh. } x \text{ } y \text{ cents})$
= sh. $kx + ky$ cents

Note 100 cents = sh. 1

$$= \text{sh. } kx + \text{sh. } \left(\frac{ky}{100}\right)$$

$$= \text{sh. } \left(kx + \frac{ky}{100}\right)$$

Example 2

Obiero is 3 years older than his brother. Their father is twice as old as their combined age. If the brother is b years old.

Write an expression to show their total age if their current total age is 63 years.

Solution:

Brother - b years old

Obiero - $(b + 3)$ years old

Father - $2(b + (b + 3))$

Therefore, brother = b years

Obiero = $b + 3$ years

Father = $4b + 6$

63 years

$\therefore b + b + 3 + 4b + 6 = 63$ collect like terms

$$\underline{6b + 9 = 63}$$

QUESTIONS ON THE TOPIC

- Wanjiku is two years older than Moraa and three years younger than Nyawich. The sum of their ages is 64. If Wanjiku's age is k , write an equation that can be used to find Wanjiku's age.
- There are c cows in a farm. The number of goats in the farm was four times that of cows but twenty more than that of sheep. The total number of animals in the farm was 250. Write an equation that can be used to find the total number of cows that were there in the farm.
- There were x men in a church. The number of children in the church was four times that of men but twenty more than that of women. The total number of women, men and children in the church was 70. Write an equation that can be used to find the number of men that were in the church?
- The number of livestock traders in a market was k . The number of cereal traders was three times that of vegetable traders but was 30 more than that of livestock traders. Write an expression to show the total number of traders in the market.
- There are k cows in a farm. The number of cows in the farm was four times that of goats but 50 more than that of sheep. The total number of animals in the farm is 400. Write an equation that can be used to find the total number of animals in the farm.
- A bookshop owner bought Newspapers, Magazines and Story books. The number of Newspapers bought was twenty more than the number of Magazines but four times that of Story books. The total number of books bought was 100. Write an equation that can be used to find the number of Magazines bought.

bought was 115. If the number of Magazines bought was x , write an equation that can be used to find the number of Magazines bought.

7. There were t Italians in a hotel. The number of French nationals in the hotel was twice that of Italians but fifty six more than that of Germans. The total number of tourists in the hotel was 104. Write an equation that can be used to find the number of Italian tourists that were in the hotel?
8. Kungu bought plates, cups and spoons. The number of spoons bought was 12 more than the number of plates. The number of cups was thrice the total number of cups and spoons. The total number of utensils bought was 112. If the number of plates bought was p , write an equation that can be used to find the number of plates bought.
9. A farmer kept Fresians, jerseys and Sahiwal cows in his farm. The number of Fresians kept was three times the number of Sahiwal but ten more than Jerseys. The total number of cows was 200. If the number of Fresians was f , write an equation that can be used to find the number of Fresians in the farm.
10. Oliech, Mariga and Oboya scored goals for their team during a football match. Oliech scored y goals while Oboya scored one less than Mariga who scored two goals less than Oliech. If the three scored a total of 7 goals, write an expression to represent their total number of goals.
11. Ole Sunkuli has p bulls. Ole Sakuda has 3 more bulls than Ole Sunkuli. Saipei has 2 bulls less than the total number that Ole Sunkuli and Ole Sakuda have. How many bulls do they have altogether?
12. Mutuku, Kimanzi, Matheka and Ndolo bought 104 goats altogether. Mutuku bought k goats and Kimanzi bought 18 goats more than Mutuku. Matheka bought twice as many goats as Mutuku. Ndolo bought as many goats as both Kimanzi and Matheka. Write the equation that can be used to find the number of goats Mutuku bought.
13. Kirwa has 20 more banana than Toroitich and 30 less than Songok. The sum of their bananas is 640. If Kirwa has b bananas, write an equation that could be used to find the number of baanas that Kirwa has.
14. Susan is t years old now. She is m years older than Zuena. Write an expression to show the sum of their ages in 8 years time.
15. Mumbua has n handbags. This is 4 times as many handbags as Moraa has. They have a

total of 15 handbags altogether. Write an expression to represent this information.

BODMAS

Example 1

What is the value of: $14 + 6 \times 4 - 24 \div 4$?

Solution:

Apply the rule of BODMAS

Thus $14 + 6 \times 4 - 24 \div 4$ start with Division

$$14 + 6 \times 4 - (24 \div 4)$$

$14 + 6 \times 4 - 6$ then solve multiplication

$$14 + (6 \times 4) - 6$$

$14 + 24 - 6$ Add and subtract

$$38 - 6 = \underline{32}$$

Example 2

What is the value of $\frac{7}{8}$ of $\left(\frac{4}{5} + \frac{1}{2}\right) \div \frac{1}{4}$

Solution:

Apply BODMAS

Thus $\frac{7}{8}$ of $\left(\frac{4}{5} + \frac{1}{2}\right) \div \frac{1}{4}$ start with bracket

$$\frac{4}{5} + \frac{1}{2} = \frac{8+5}{10} = \frac{13}{10}$$

$\frac{7}{8}$ of $\frac{13}{10} \div \frac{1}{4}$ solve 'of' next $\frac{7}{8} \times \frac{13}{10} = \frac{91}{80}$

$\frac{91}{80} \div \frac{1}{4}$ multiply by the reciprocal of $\frac{1}{4}$

$$\frac{91}{80} \times \frac{4}{1} = \frac{91}{20} = 4\frac{11}{20}$$

QUESTION ON THE TOPIC

1. Work out: $\left(\frac{1}{3} \text{ of } 5\frac{1}{4}\right) - 5\frac{1}{2} \div 4\frac{2}{5} + 3$
2. What is the value of $11(9^2 - 6^2) + 51 \div 3$?
3. What is the value of: $5\frac{3}{4} - 2\frac{3}{5} \times 2\frac{1}{7} + \frac{3}{4}$ of $1\frac{1}{3}$?
4. What is the value of:
 $840 - 24 \times 12 + 48 \div 12$?
5. Simplify: $\frac{\frac{1}{4} + \frac{1}{5}}{\left(\frac{1}{3}\right)^2 + \left(\frac{1}{2}\right)^2}$
6. What is the value of: $\frac{2.4 + 0.6 \times 0.32 \div 0.2}{0.04}$?
7. What is the value of:
 $36 \div 4 + 6 \times 8 - 10 \div 2 \times 7 + 3$?
8. What is the value of:
 $0.4 + 0.3 \times 1.2 + 0.8 \div 0.04 + 2.2 - 1.4$?
9. What is the value of: $1 \div \left(4\frac{3}{4} - \frac{1}{4} \text{ of } 7\frac{1}{5}\right)$?

10. What is the value of:
 $36 \div 9 + 8 \times 10 - 9 \div 3 \times 6 + 4?$
11. What is the value of:
 $18 + 36 \div 9 \times 15 \div 3 + 48 - 12 \times 2?$
12. What is the value of: $24 + 6 \times 8 - 40 \div 4?$
13. What is the value of: $2 + 4 + 5(3 + 8 + 9)?$
14. What is the value of:
 $\frac{2}{3} + \frac{1}{2}$ of $(\frac{1}{2} - \frac{1}{5}) \div \frac{3}{5} \times \frac{2}{5}?$
15. What is the value of: 7
 $72 \div 12 + 4 \times 6 - 16 \div 4 \times 6 + 3?$
16. What is the value of $\frac{5}{8}$ of $40 - 36 \times \frac{1}{9} \div \frac{1}{4}?$

TABLES AND INTERPRETATION

WORKED OUT EXAMPLE

Example 1:

The table below shows the number of cars, matatus and buses which transported people to Bomas of Kenya.

DAYS	CARS	MATATUS	BUSES
FRIDAY	52	23	12
SATURDAY	45	18	15

Each car took 4 people, each matatu 14 people and each bus 60 people. How many people had visited Bomas by the end of the second day using the three types of vehicles?

Find the total number of cars, matatus and buses for the two days.

$$\begin{array}{ll} \text{Cars } 52 + 45 = 97 & 97 \times 4 = 388 \\ \text{Matatus } 23 + 18 = 41 & 41 \times 14 = 574 \\ \text{Buses } 12 + 15 = 27 & 27 \times 60 = 1620 \\ \text{Total number of people} & 2,582 \text{ people} \end{array}$$

QUESTIONS ON THE TOPIC

1. The table below shows how four athletes performed. The number of times each athlete was placed in either 1st, 2nd or 3rd position is shown.

Athlete	1 st	2 nd	3 rd
SHIRO	0	2	1
NIMO	1	3	0
CARO	4	2	1
SHIKO	3	0	1

1st position is awarded 7 points
 2nd position is awarded 4 points
 3rd position is awarded 1 point

How many points were awarded to the athletes altogether?

2. The table below shows distances in kilometres between K, L, M and N.

K	L	M	N
90			
123	147		
113	150	82	

What is the distance from N to K via M and L?

3. The table below shows bus fares from Nyahururu to Nairobi for an adult.

Nyahururu	Olkalou	Gilgil	Naivasha	Nairobi
70				
150	100			
200	150	80		
300	250	200	150	

Two adults and five children travelled from Nairobi to Gilgil. The following day they travelled from Gilgil to Nyahururu. The fare for a child is half that of an adult. How much did they pay altogether for the whole journey?

4. The table below shows the pairs of shoes sold per day for six days in a shop. If the mean for the week was 33 pairs, what is the sum of the pairs sold on Tuesday and Wednesday?

Days of the week	MON	TUE	WED	THU	FRI	SAT
No. of Pairs sold	24	32		42	38	18

5. The table below shows the number of eggs produced and sold by a farmer in 6 days.

Days	MON	TUE	WED	THU	FRI	SAT
Eggs produced	150	100	90	120	210	180
Eggs sold	350	80	120	100	90	200

On which day was the number of eggs produced two and a third times the number of eggs sold?

6. The table below shows the number of animals in a park. The number of giraffe is not given.

Type of Animal	Monkeys	Giraffes	Antelopes	Jackals
No. of Animal	962		740	370

If the average number of animals was 578, what was the number of giraffes?

7. A trader had money in form of notes as follows;

Values of notes in shillings	Sh. 1000	Sh. 500	Sh. 200	Sh. 100	Sh. 50
Number of notes	5	11	7	13	42

The trader converted the money into equal number of sh. 200 and sh. 100 notes. How many notes in total did the trader get?

8. The table below shows fares to different towns in shillings.

Station	Kisumu	Kericho	Nakuru	Naivasha	Nairobi
Kisumu	-	140	380	530	600
Kericho	140	-	250	400	500
Nakuru	380	250	-	150	300
Naivasha	530	400	150	-	170
Nairobi	600	500	300	170	-

Two teachers and 20 pupils travelled from Nairobi to Nakuru. The following day they travelled from Nakuru to Kericho. The fare for a pupil is half of that of an adult. How much did they pay altogether for the whole journey?

9. The table below shows the number of cars, matatus and buses which transported people to a trade fair.

Days	Cars	Matatus	Buses
Monday	32	72	11
Tuesday	26	84	10
Wednesday	40	68	9

Each car took 4 people, each Matatu took 14 people while each bus took 72 people. How many people visited the trade fair by the end of the third day using the three types of vehicles?

10. The table below shows the sales of meat by a butcher in five days. The sale for Wednesday is NOT shown.

Days	Mon	Tue	Wed	Thu	Fri	Sat
No. of kilograms	30	42		38	28	48

One kilogram of meat was sold for sh. 240. The butcher got a total of sh. 56,640 for the sale of meat during the six days. How many more kilograms of meat did the butcher sell on Wednesday than on Friday?

11. The incomplete table below shows the number of people who attended a rugby match and the entrance charges. The number of children is not shown.

	No. of people	Entrance charges in Kshs
Children		50
Students	860	100
Female adults	710	150
Male adults	650	200

If the total amount collected was sh. 330,000, how many people altogether attended the match?

12. The table below shows the number of fruits sold by a vendor in two days.

Friday	Mangoes	Oranges	Guavas	bananas
	36	80	56	78

The fruits were arranged and sold in piles as follows;

A pile of 3 mangoes for sh. 10

A pile of 5 oranges for sh. 20

A pile of 4 guavas for sh. 20

A pile of 6 bananas for sh. 15

How much money did the vendor get in the two days?

13. The table below shows the prices of food in a restaurant.

	Beef	Beans	Fish	Chicken
Ugali	80	40	100	150
Chapati	100	50	120	170
Rice	90	60	130	150

A group of 18 women ordered for food as follows;

8 women ate Rice and fish

6 women ate Ugali and chicken

The rest ate Chapati and beef

How much did they pay for the food?

14. A newspaper vendor sold newspaper all the days of the week. The table below shows the number of newspaper the vendor sold for six of the seven days.

Days of the week	Sun	Mon	Tue	Wed	Thu	Fri	Sat
No. of Newspapers	147	136		140	108	112	128

Sunday newspapers cost sh. 40 each while for the other days the newspaper cost sh. 35 each. If the mean sale per day was sh. 4,650, how much more money did the vendor get from selling newspapers on Tuesday than on Thursday?

15. The table below shows how std. 8 pupils scored in a composition. The composition was marked out of 40 marks.

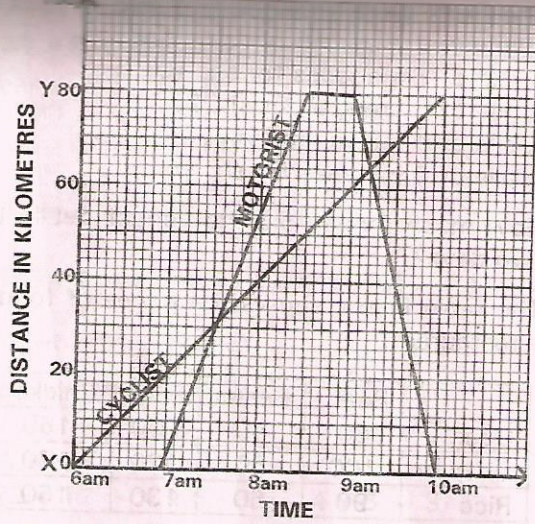
Scores	34	32	30	27	24	22
Frequency	6	5	8	8	7	6

What was the mean score?

GRAPHS – LINE GRAPHS

Example 1:

Below is a travel graph showing the journey of a motorist travelling from town X to town Y and back and that of a cyclist travelling from town X to town Y.



What is the difference in their average speeds for the whole distance covered by the cyclist and the motorist in km/h?

Solution:

$$\text{Cyclist : Average speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

$$\begin{aligned} \text{Time taken } 10\text{am} - 6\text{am} &= 4 \text{ hours} \\ &= \frac{80\text{km}}{4\text{hr}} \\ &= 20\text{km/h} \end{aligned}$$

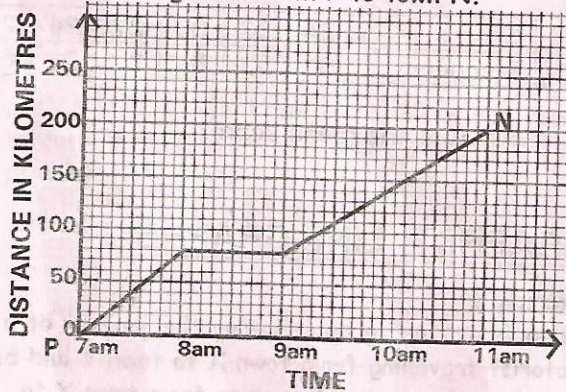
$$\text{Motorist : Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$\begin{aligned} \text{Time taken } 10\text{am} - 7\text{am} &= 3\text{hrs} \\ \text{Total distance} &= 80 + 80 = 160\text{km} \\ &= \frac{160\text{km}}{3\text{hours}} \\ &= 53\frac{1}{3}\text{km/h} \end{aligned}$$

$$\begin{aligned} \text{Difference in speed} &= 53\frac{1}{3}\text{km/h} - 20\text{km/h} \\ &= 33\frac{1}{3}\text{km/h} \end{aligned}$$

Example 2

The graph below represents the journey of a motorist travelling from town P to town N.



(i) What was the average speed for the whole journey?

Solution:

$$\text{Average speed} = \frac{\text{Distance covered}}{\text{Time taken}}$$

$$\text{Time taken} = 11\text{am} - 7\text{am} = 4\text{hrs}$$

$$\begin{aligned} &= \frac{200\text{km}}{4\text{hrs}} \\ &= 50\text{km/h} \end{aligned}$$

(ii) How long did the motorist rest?

Solution:

$$9\text{am} - 8\text{am} = 1 \text{ hours}$$

(iii) What was the average speed before the rest?

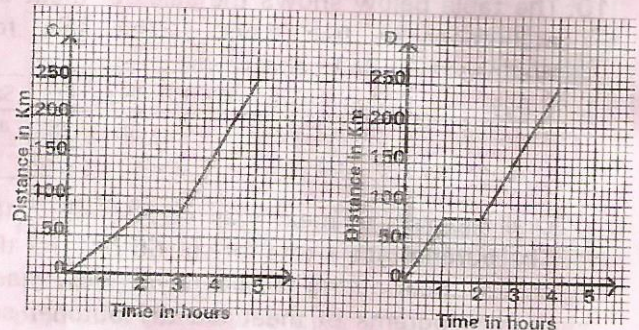
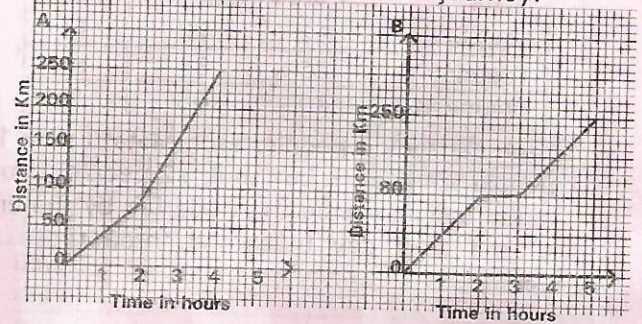
Solution:

Before resting, the distance covered was 80km
Before resting, the time taken was 1 hour

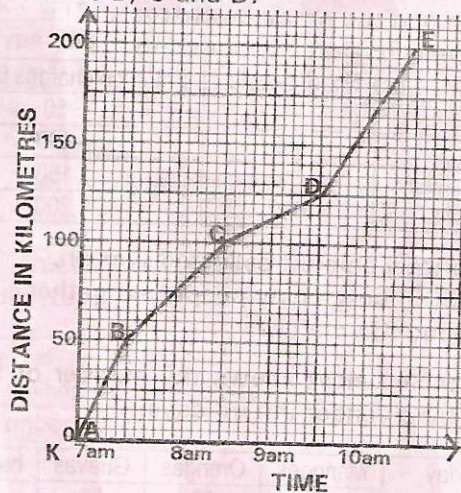
$$\begin{aligned} \text{Therefore average speed} &= \frac{80\text{km}}{1\text{hr}} \\ &= 80\text{km/h} \end{aligned}$$

QUESTIONS ON THE TOPIC

1. A motorist drove for 2 hours at an average speed of 40km/h. He rested for one hour and continued for 2 hours at an average speed of 85km/hr. Which one of the graphs below represents the motorist's journey.

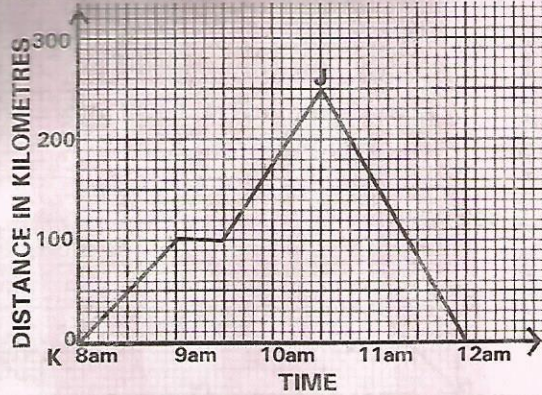


2. The graph below shows an inspectors journey from factories A to E through factories B, C and D.



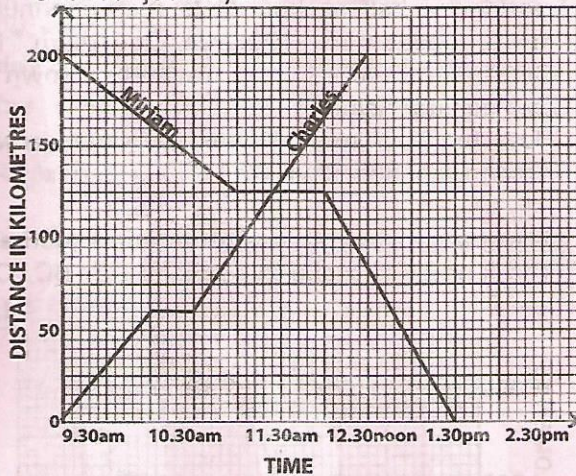
Between which two factories was he

3. The graph below shows a motorist's journey from town K to town J and back.



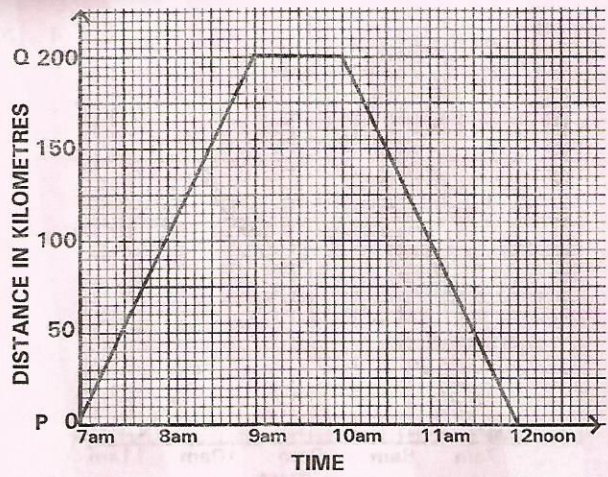
What was the motorist's average speed for the whole journey?

4. The graph below represents Miriam's and Charles' journeys.



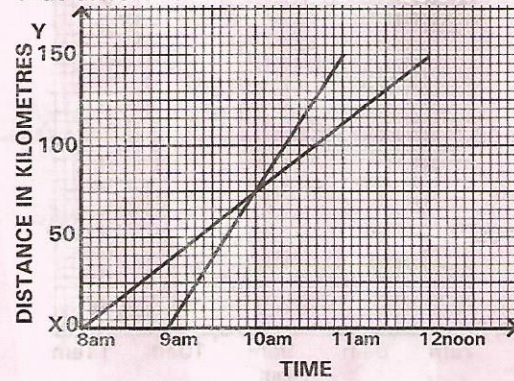
Which statement is NOT correct about the above graph?

- Before resting, Miriam's speed was 75km/h
 - Charles and Miriam met at 11.54a.m
 - At 10.30am, the distance between Charles and Miriam was 102½ km.
 - Charles' average speed for the whole journey was 60km/h
5. The graph below shows a line representing a motorist travelling steadily from town P to town Q 200km away and later returning from Q to P along the same road. Draw a line on the graph to represent a lorry which leaves town P at 9.am and drives steadily to town Q arriving there at 12 noon.



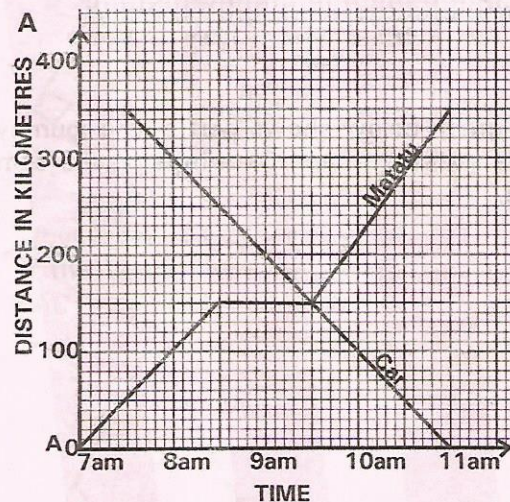
How far apart from each other will the lorry and the motorist be at 10.30a.m?

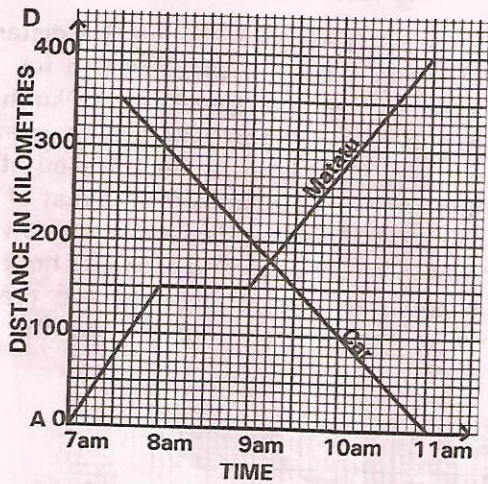
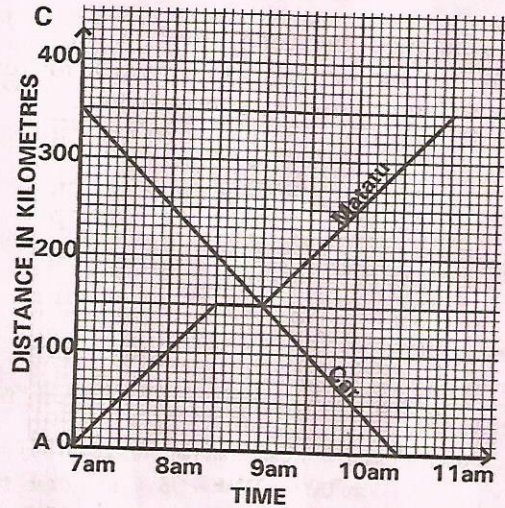
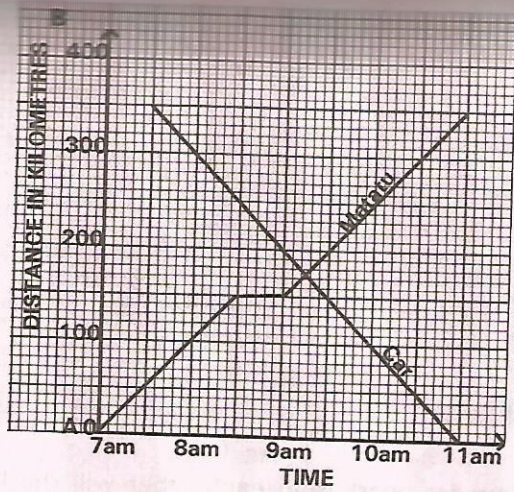
6. The distance between town X and Y is 150km. Two motorists left town X for town Y at different times as shown below.



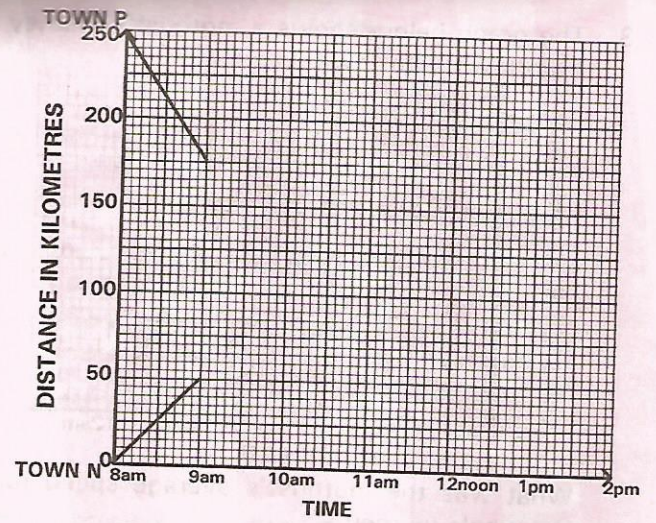
What is the vertical and horizontal scale.

7. A matatu left town A for town B a distance of 350km at 7.am. After travelling for 1½ hours at an average speed of 100km/hr it got a puncture. It took 30 min to change the wheel. The Matatu then travelled at an average speed of 100km/h for the rest of the journey. On the same day a car left town B for town A at 7.30a.m and took 3½ hours to reach town A. Which one of the graphs below represents the Matatu and the car journey?



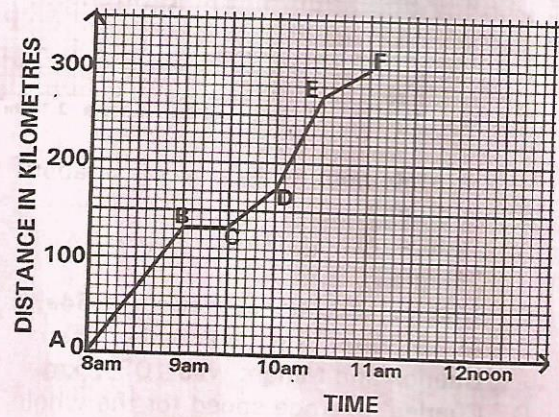


8. The graph below shows part of the journeys made by Arocho and Okusimba on the same road.



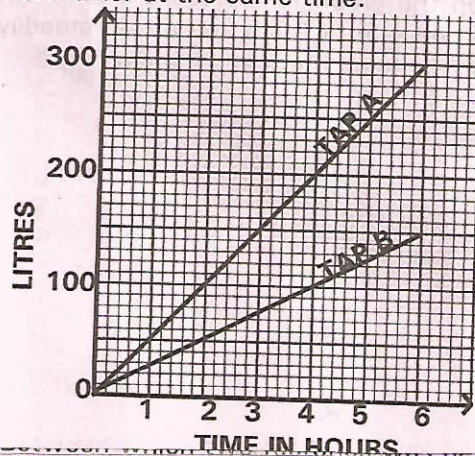
Arocho travelled from town P towards town N at a constant speed for two hours before resting for half an hour. He then continues at a speed of 100km/h to town N. Okusimba travelled from town N to town P at a constant speed. How far from town P was Okusimba when Arocho reached town N?

9. The graph below shows a motorists journey. The journey is made in sections AB, BC, CD and DE.



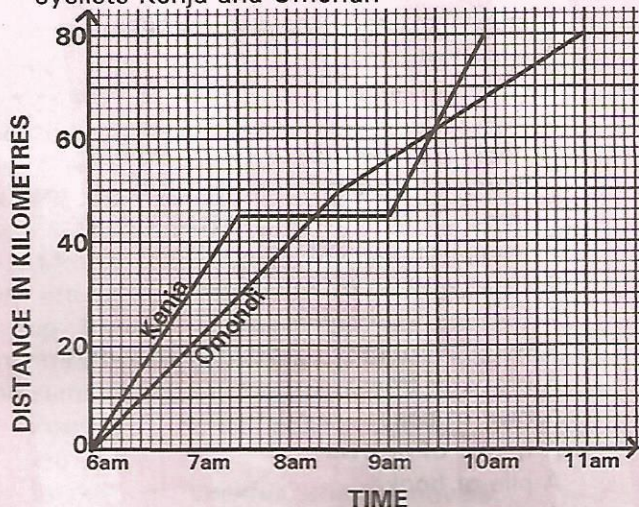
Between which two sections was the speed 80km/h?

10. The graph below shows the amount of water flowing from two taps A and B at a given time. Water from both taps flows into a container at the same time.



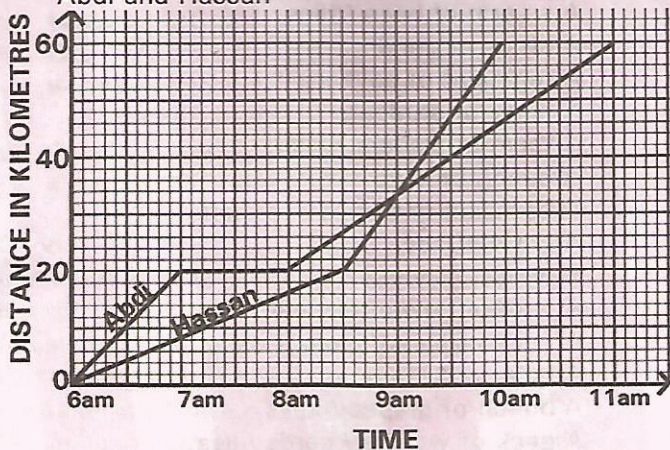
What is the total amount of water in the container at the end of 5 hours?

11. The graph below shows the journeys of two cyclists Kenja and Omondi?



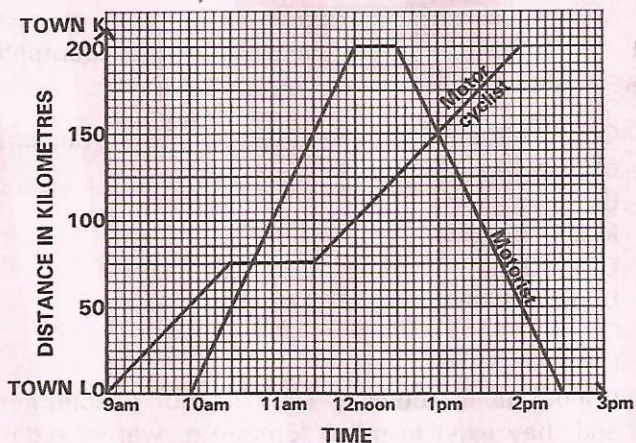
At what time was Omondi 11km ahead of Kenja?

12. The graph below shows journeys made by Abdi and Hassan



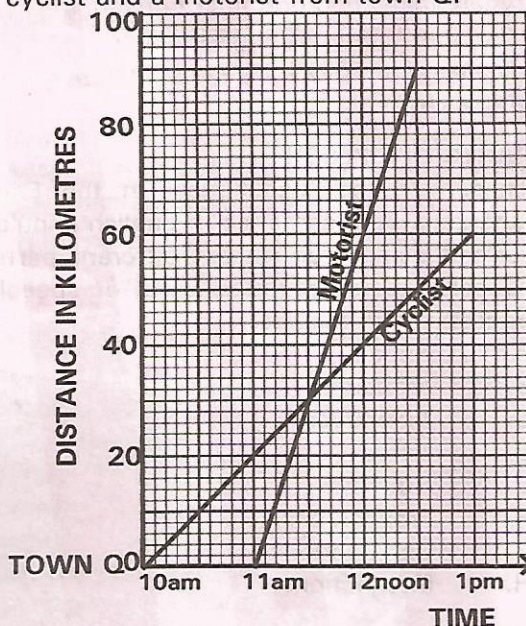
What was the difference in speed at the time Hassan overtook Abdi?

13. Below is a travel graph showing the journey of a motorist travelling from town L to town K and back and that of a motor cyclist travelling from town L to town K.



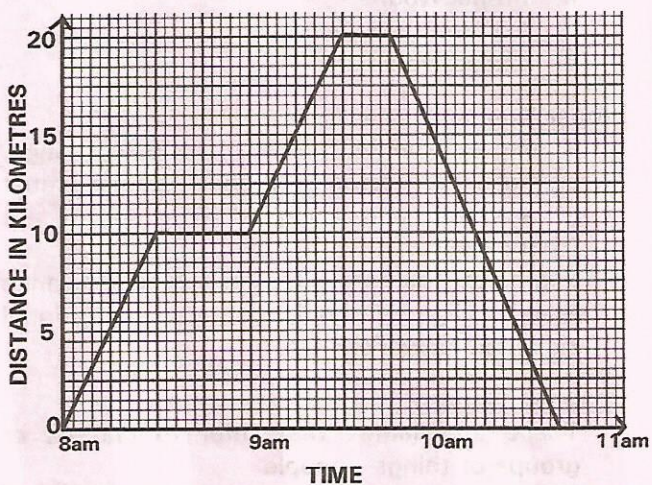
How far from town L was the motor cyclist when he met the motorist travelling back to town L?

14. The graph below shows the journeys of a cyclist and a motorist from town Q.



How far behind the motorist was the cyclist at noon?

15. Omwega cycled from his house to the market and back. He left his house at 8a.m.



How long did Omwega take from the market to his house?