

Answer ALL the questions.

1. (a) Evaluate $(75 + 25 \div 2) - 100$.
- (b)(i) Express $20\frac{1}{4}\%$ as a decimal.
- (ii) Correct your answer in (b)(i) to 2 significant figures.

Answers: (a) _____ [2]

(b)(i) _____ [1]

(ii) _____ [1]

2. (a) Expand $\left(x^3 - \frac{x}{2}\right)^2$.
- (b) Factorize the following:
- (i) $x^2 - x - 2$,
- (ii) $x - a + bx - ab$,
- (iii) $8x^4 - 18$.

Answers: (a) _____ [1]

(b)(i) _____ [1]

(ii) _____ [2]

(iii) _____ [2]

3. Make s the subject of the equation:

(a) $sk = 2s + 1,$

(b) $\frac{1}{s} = \frac{a}{y-s}.$

Answers: (a) $s =$ _____ [2]

(b) $s =$ _____ [2]

4. For a particular map, 1 cm on the map represents 550 m actual distance.

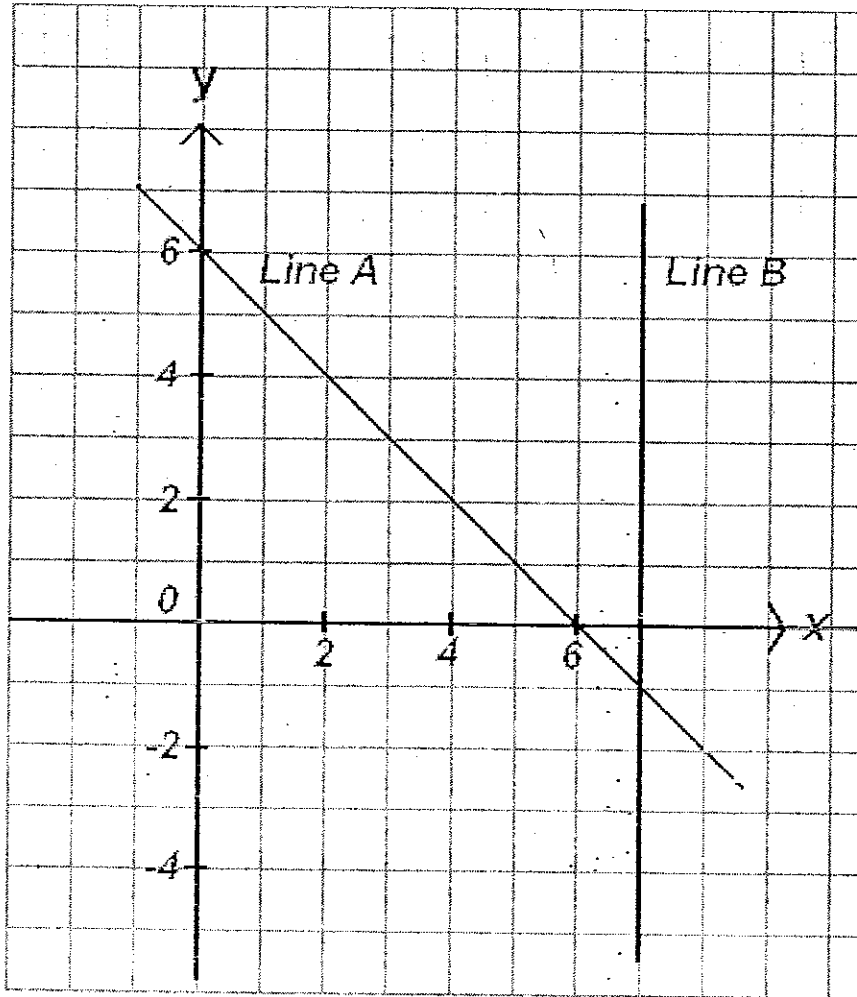
(a) Given that the scale of this map is 1:5x, find the value of x .

(b) Given a road of actual length 11 km, find its length on the map.

Answers: (a) $x =$ _____ [2]

(b) _____ cm [1]

5. (a) Find the equation of Line A and Line B:



- (b) If you are to solve the equations of Line A and Line B simultaneously using graphical method, what will the solution be?

Answers: (a) Equation of Line A is _____ [1]

Equation of Line B is _____ [1]

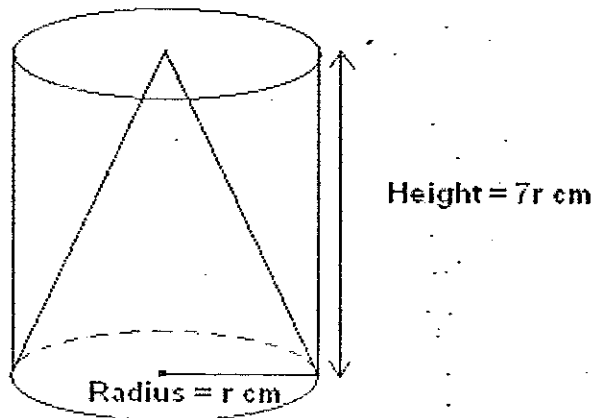
(b) $x =$ _____, $y =$ _____ [2]

6. A solid cone is fitted exactly into an enclosed cylindrical container such that they have the same base area and the vertex of the cone touches the top of the container. (Referring to the diagram below, not drawn to scale)
The container has a height of $7r$ cm, and its radius at the base is r cm.

Form an expression in terms of r ,

- (a) the volume of the cylinder (including the cone),
(b) the volume of air inside the cylinder.

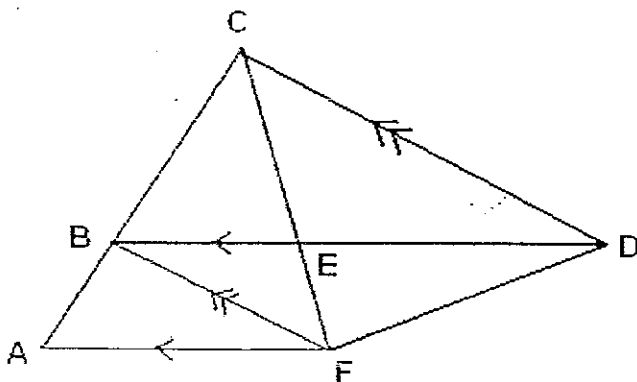
(Take π to be $\frac{22}{7}$)



Answers: (a) _____ cm^3 [1]

(b) _____ cm^3 [2]

7. Given that $AF \parallel BD$ and $BF \parallel CD$, state 2 pairs of similar triangles.



(a) Δ _____ is similar to Δ _____ [1]

(b) Δ _____ is similar to Δ _____ [1]

8. Solve the following pair of simultaneous equations:

$$x = y + 1$$

$$y = 4x - 13$$

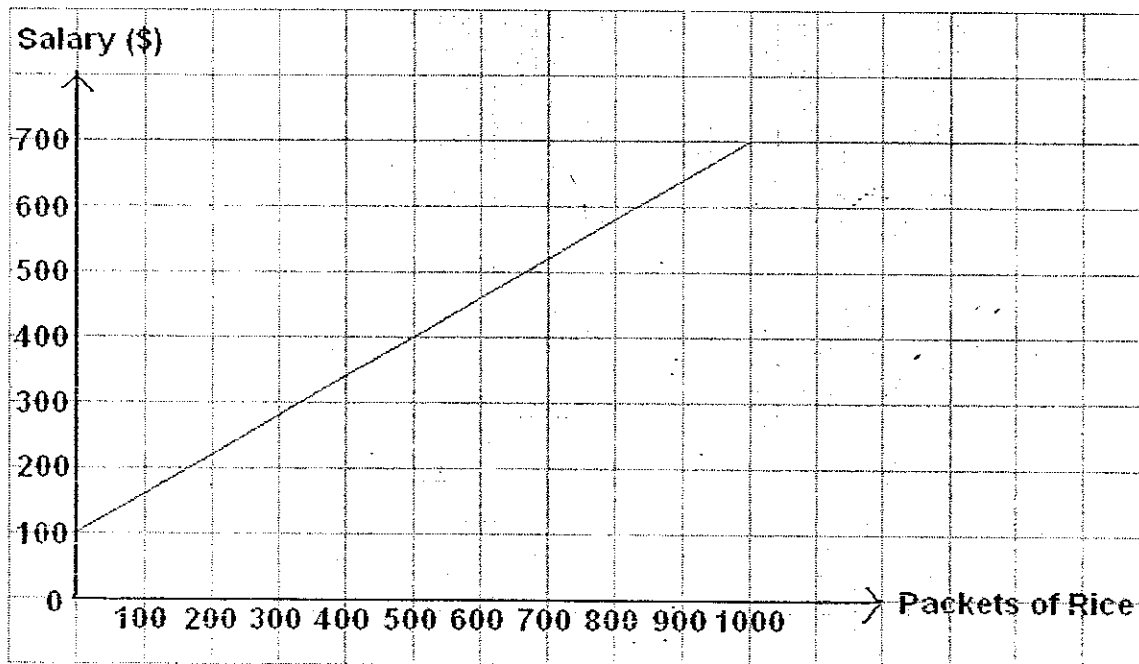
Answers: $x =$ _____, $y =$ _____ [4]

9. Mrs Li walked to the market in the morning, which she took $\frac{x}{2}$ hour to reach.
- (a) Given that her walking speed is $(x - 2)$ km/h, write down an expression in terms of x , of the distance between the market and her house.
- (b) Given that the market is $(x^2 - 3x)$ km away from her house, find the value of x .

Answers: (a) _____ km [1]

(b) $x =$ _____ [3]

10. A worker helps to transport rice for a living. He receives a basic salary of \$100 and the total amount he earns for the month depends on the number of packets of rice he is able to transport, as shown in the graph below.



- (a) If he only transports 220 packets of rice, how many more packets should he transport in order to earn \$700?
- (b) Given that he pays for his own vehicle petrol, and the cost for petrol in a particular month is \$400, what is the minimum packets of rice that he needs to transport so as not to make a loss?

Answers: (a) _____ packets [1]

(b) _____ packets [1]

11. Find the HCF and LCM of $4x^2yz$ and $16axy^3$

Answers: (a) HCF = _____ [1]

(b) LCM = _____ [1]

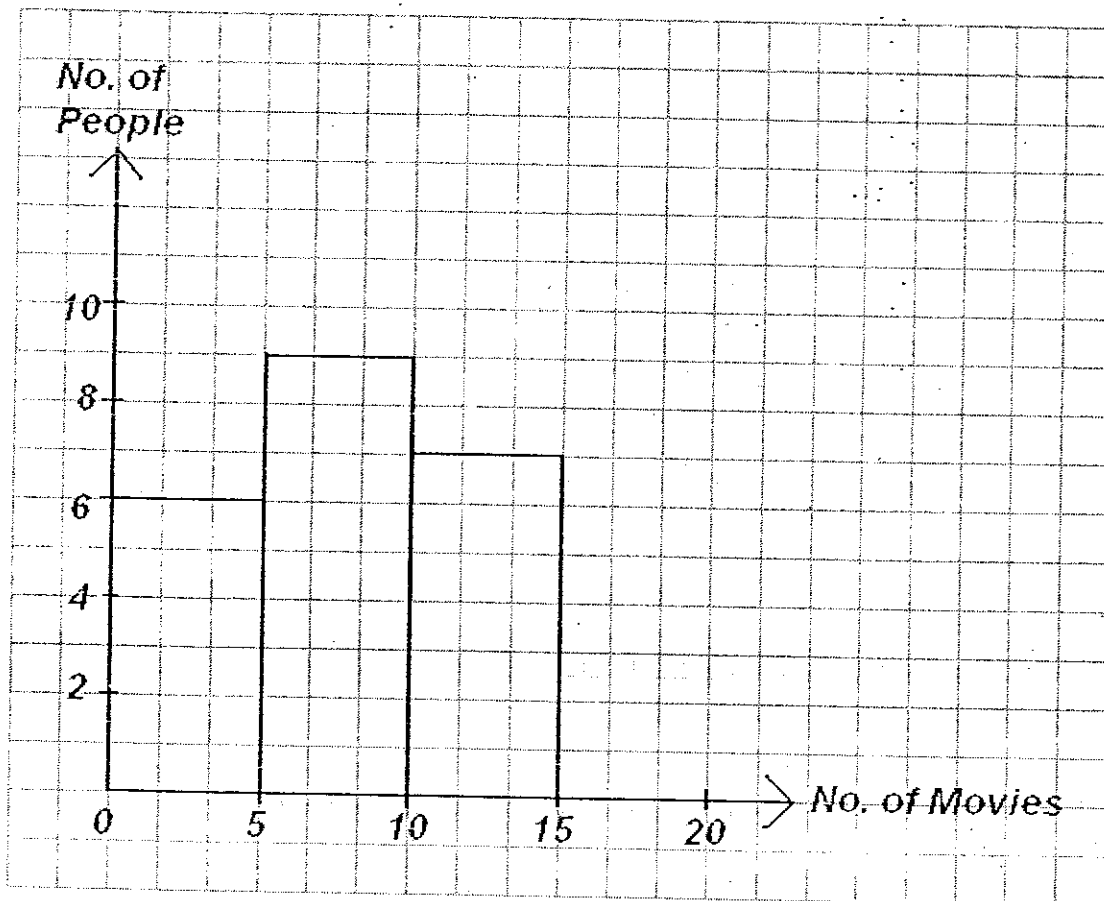
12. There are 9 apples in a basket of which 6 are sweet, 1 is sour and 2 are tasteless. If an apple is randomly chosen, what is the probability of choosing an apple that is not sweet?

Answer: _____ [1]

13. The histogram below shows the number of movies that 30 people watched in a year.
 (a) Complete the histogram below by drawing in the bar for the range of 15 to 20 movies. [1]

- (b) How many people watched less than or equals to 10 movies in a year?

Answer: _____ people [1]



14. x varies directly as y and when $x = 1$, $y = 5$.
- Form an equation that links x and y .
 - Find x when $y = 30$.

Answers: (a) _____ [2]

(b) $x =$ _____ [1]

15. Combine each of the following expressions into a single fraction, reduced to its lowest term:

(a) $\frac{1}{x-2} + \frac{1}{2x-4}$,

(b) $\frac{x-y}{a-b} \div \frac{x}{a-b}$.

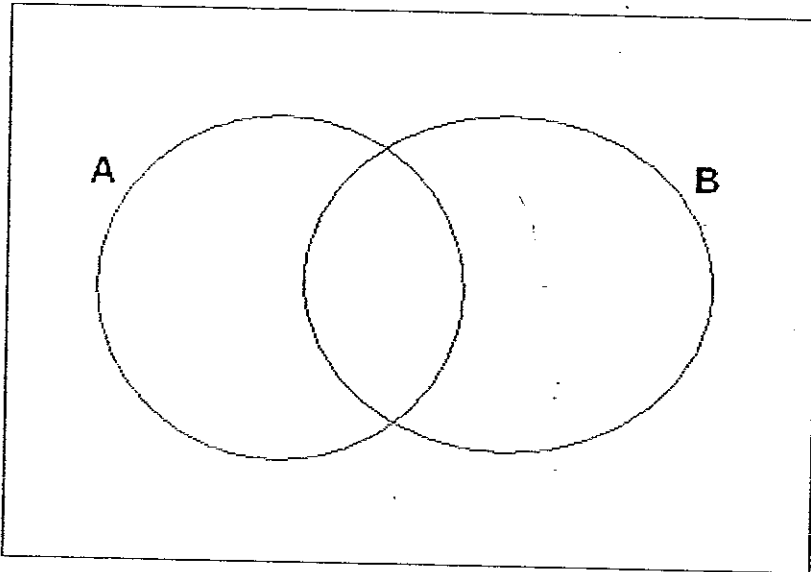
Answers: (a) _____ [2]

(b) _____ [2]

16. Shade clearly the following set:

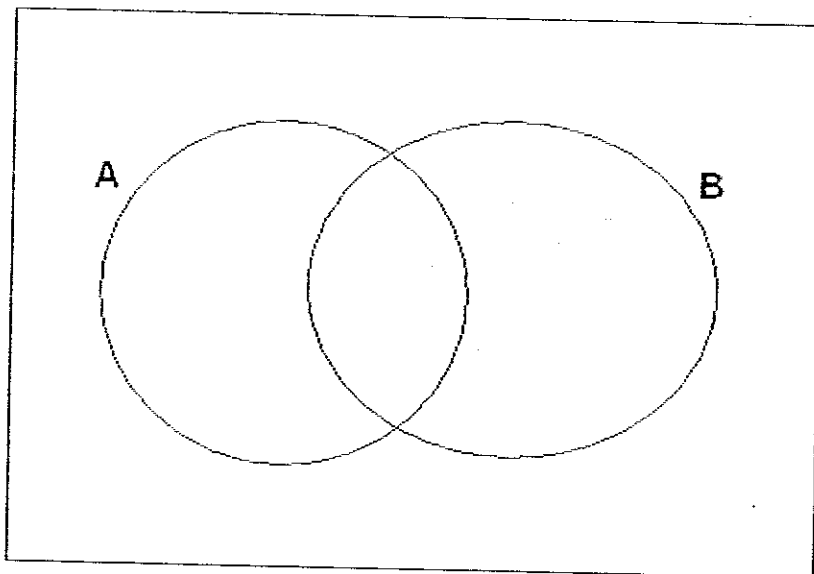
(a) $(A \cap B)'$

[1]



(b) $(A \cup B) \cap B'$

[1]



----- End of Paper -----

Solutions:

1 (a) -12.5 (b)(i) 0.2025 (ii) 0.20

2(a) $x^6 - x^4 + \frac{1}{4}x^2$ (b) (i) $(x+1)(x-2)$ (ii) $(x-a)(1+b)$ (iii) $2(2x^2+3)(2x^2-3)$

3 (a) $s = \frac{1}{k-2}$ (b) $s = \frac{y}{a+1}$

4 (a) $x = 11,000$ (b) 20 cm

5(a) Line A: $y = -x + 6$ Line B: $x = 7$ (b) $x = 7, y = -1$

6(a) $22r^3 \text{ cm}^3$ (b) $14\frac{2}{3}r^3 \text{ cm}^3$

7(a) $\triangle CBE$ similar to $\triangle CAF$; $\triangle BEF$ similar to $\triangle DEC$; $\triangle CBD$ similar to $\triangle BAF$

8) $x = 4, y = 3$

9(a) $\frac{1}{2}x(x-2)$ km (b) $x = 4$

10(a) 780 packets (b) 500 packets

11) HCF = $4xy$ LCM = $16ax^2y^3z$

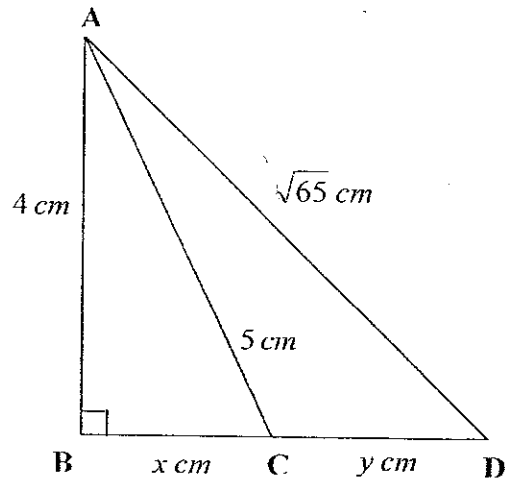
12) $\frac{1}{3}$

13(b) 15

14(a) $x = \frac{1}{5}y$ (b) $x = 6$

15(a) $\frac{3}{2(x-2)}$ (b) $\frac{x-y}{x}$

1. $\triangle ABD$ is a right angled triangle. C is a point on BD.
 (a) Solve for x and y .
 (b) Hence find the area of the $\triangle ACD$.



Answers: 1) (a) $x =$ _____ cm [1]
 $y =$ _____ cm [2]
 (b) _____ cm^2 [1]

2. In a factory, 10 workers can produce a certain number of motherboards in 14 days. What is the minimum number of workers required if the same number of motherboards are to be produced in 8 days' time? Assume that all workers work at the same rate.

Answers: 2) _____ workers [2]

3. Given that $\varepsilon = \{x: 1 < x < 20, x \in \mathbb{Z}^+\}$, $P = \{x: x \text{ is an even number}\}$,
 $Q = \{x: x \text{ is a prime number}\}$ and $R = \{x: x \text{ is a factor of } 70\}$.
- (a) List all the elements in set Q .
 - (b) Write down the element that is common to both sets P and Q .
 - (c) Find $n(R \cap Q)$.
 - (d) Is it 'TRUE' or 'FALSE' that $P \cup Q = \varepsilon$?

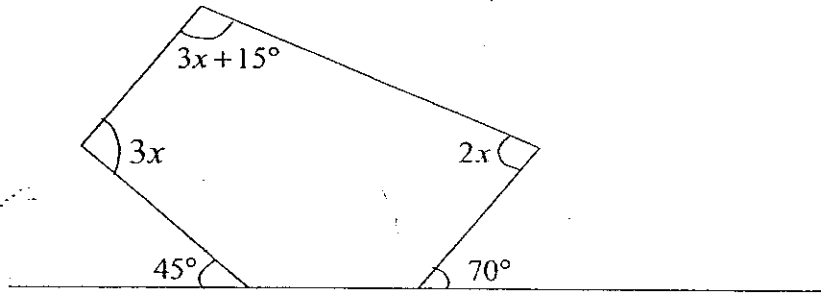
Answers: 3) (a) $Q =$ _____ [1]

(b) _____ [1]

(c) $n(R \cap Q) =$ _____ [1]

(d) _____ [1]

4. (a) Find the value of x from the figure below.
(Note: The diagram is not drawn to scale.)



- (b) Each exterior angle of a regular polygon with 24 sides is 5° less than each exterior angle of a regular polygon with n sides. Calculate the value of n .

Answers: 4) (a) $x =$ _____ [3]

(b) $n =$ _____ [2]

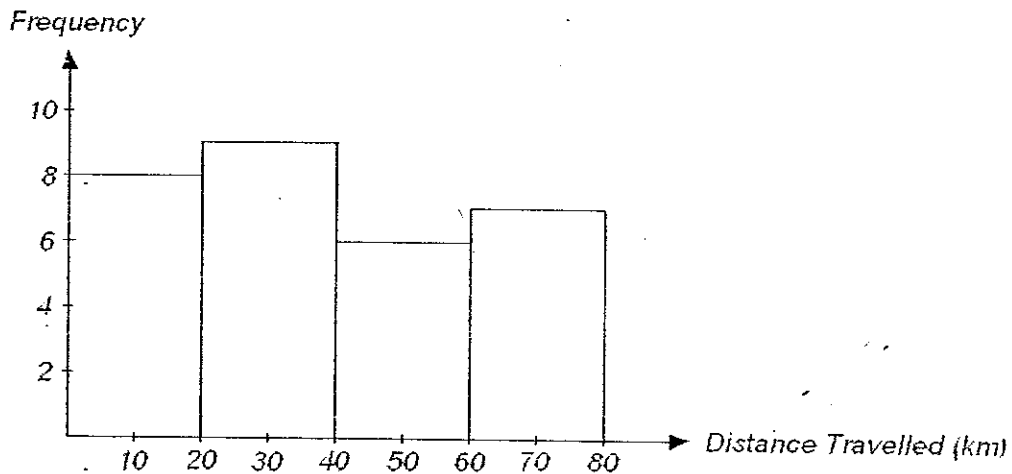
5. On Map A, 5 *cm* represents 8 *km* on the ground.
On Map B, 2 *cm* represents 9 *km* on the ground.
- (a) Express the scale of Map A in representative fraction.
- (b) Calculate the actual distance on the ground, in *km*, between CCHMS and Pasir Ris Park which is represented by 7.5 *cm* on Map A.
- (c) The dimensions of a rectangular field are 6 *cm* by 14 *cm* on Map A. Calculate the area of the same rectangular field on Map B, correct to 2 decimal places.

Answers: 5) (a) R.F = _____ [1]

(b) _____ *km* [1]

(c) _____ *cm*² [4]

6. The histogram below shows the distances travelled by a MacDonald's delivery man in 30 days.



- (a) Complete the grouped frequency table below using the histogram given. Let the distance travelled be d km.

Class Interval	Mid-value	Frequency
$0 < d \leq 20$		
$20 < d \leq 40$		
$40 < d \leq 60$		
$60 < d \leq 80$		

[2]

- (b) Find the estimated mean distance travelled by the delivery man.

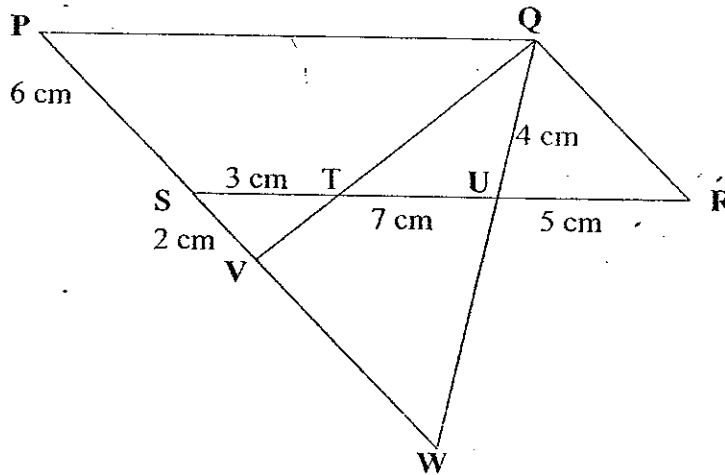
Answer: 6) (b) _____ km [1]

6. (c) If the distance is chosen at random from the 30 days, find the probability that the distance travelled by the delivery man is
- (i) not more than 20 km,
 - (ii) more than 40 km .

Answers: 6) (c) (i) _____ [1]

(ii) _____ [1]

7. In the diagram, $PQRS$ is a parallelogram.
 PS is parallel to QR and PQ is parallel to SR .
 $ST = 3$ cm, $TU = 7$ cm, $UR = 5$ cm, $QU = 4$ cm, $PS = 6$ cm and $SV = 2$ cm..
- (a)(i) Name a triangle similar to triangle QUR .
 (ii) Calculate the length of UW .
- (b)(i) Name a triangle similar to triangle WSU .
 (ii) Calculate the length of VW .

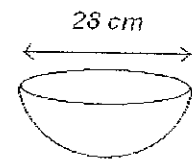
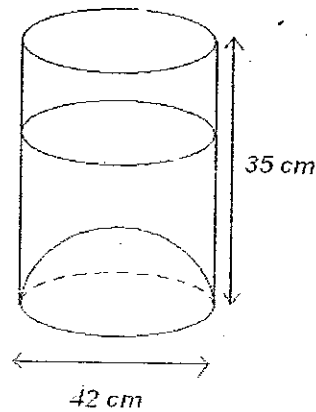


- Answers: 7) (a) (i) $\triangle QUR$ is similar to _____ . [1]
 (ii) _____ cm [2]
- (b) (i) $\triangle WSU$ is similar to _____ . [1]
 (ii) _____ cm [2]

8. An open cylindrical tank with a hollow hemispherical base has diameter 42 cm and height 35 cm. Take π to be $\frac{22}{7}$.
- (a) Find the internal surface area of the open cylindrical tank with a hollow hemispherical base.
 - (b) If the container is filled with water to a height of 30 cm,
 - (i) Find the volume of water in the tank.
 - (ii) The water in the tank was then drained through a valve till n hemispherical bowls of internal diameter 28 cm are **completely** filled. Find n .

Open Cylindrical Tank

Hemispherical Bowl



Answers: 8) (a) _____ cm^2 [2]

(b) (i) _____ cm^3 [4]

(ii) _____ [3]

Answer Question 9 completely on a separate piece of graph paper.

9. A ball was thrown upwards from one of the windows of a vertical building. At any instant, the horizontal distance of the ball from the building is x metres and the vertical height of the ball above the ground is y metres. The vertical height of the ball in relation to its horizontal distance is given by $y = 6 + 5x - x^2$.

a. Copy and complete the table below.

x metres (horizontal distance)	0	1	2	3	4	5	6
y metres (vertical height)	6	10		12			0

[3]

- b. Using a scale of 2 cm to represent 1 metre on the x -axis and 2 cm to represent 2 metres on the y -axis, draw the graph of y against x for $0 \leq x \leq 6$ and $0 \leq y \leq 14$.

[2]

c. From the graph, estimate

- (i) the vertical height of the ball when the horizontal distance is 1.5 metres, [1]
- (ii) the greatest height above the ground reached by the ball, [1]
- (iii) the horizontal distance from the building where the ball first strikes the ground, [1]
- (iv) the horizontal distance traveled by the ball during the period of time when it is more than 9 metres above the ground. [1]

----- End of Paper -----

Chung Cheng High School Main
End-Of-Year Examinations 2007
Secondary 2
Mathematics Paper 2 (Answers)

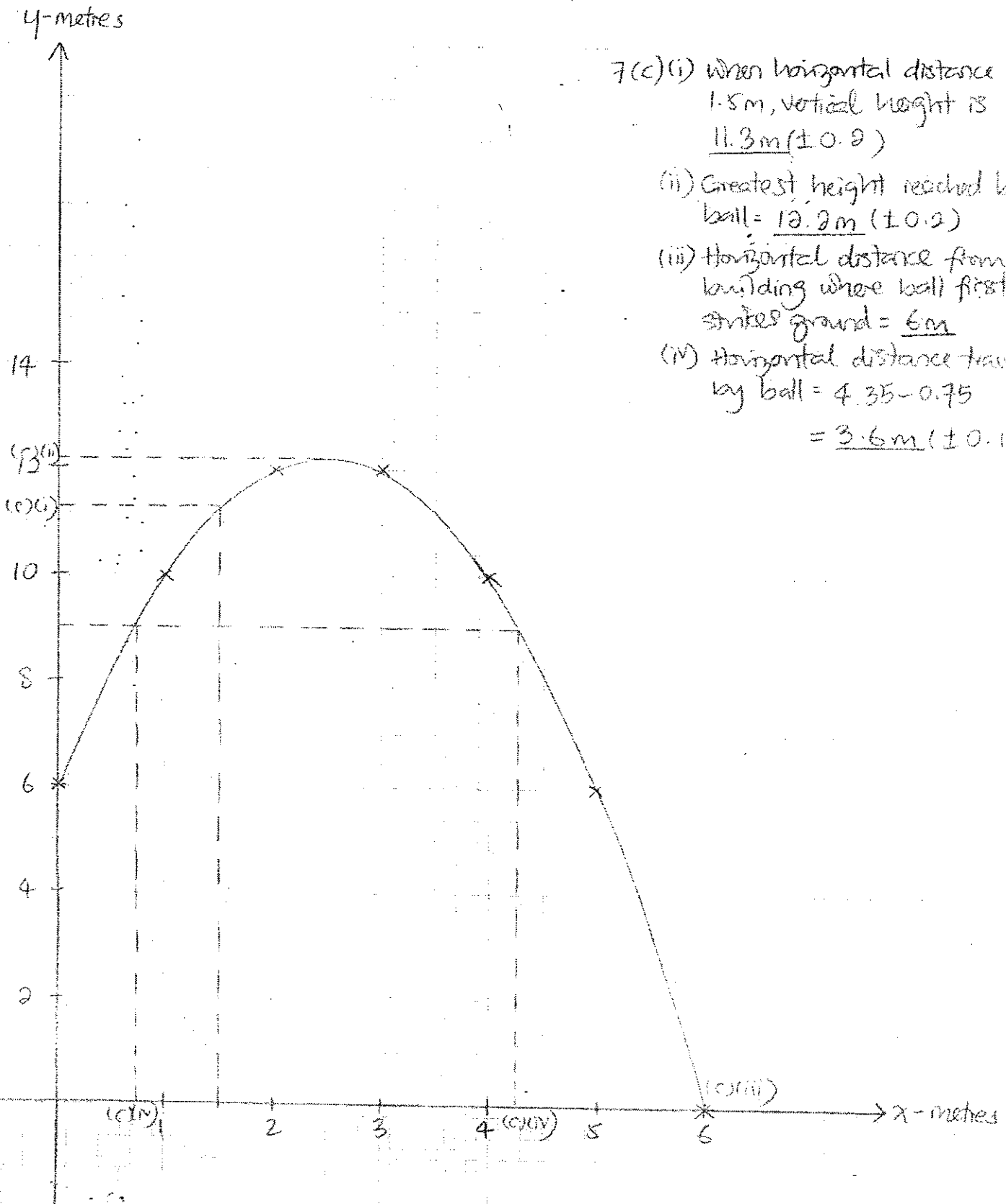
1 (a)	$x = 3cm, y = 4cm$		
(b)	$8cm^2$		
2	18 workers		
3 (a)	$Q = \{2,3,5,7,11,13,17,19\}$		
(b)	2		
(c)	$n(R \cap Q) = 3$		
(d)	False		
4 (a)	$x = 35^\circ$		
(b)	$n = 18$		
5 (a)	$R.F. = \frac{1}{160000}$		
(b)	12km		
(c)	$10.62cm^2$		
6 (a)	Class Interval	Mid-value	Frequency
	$0 < d \leq 20$	10	8
	$20 < d \leq 40$	30	9
	$40 < d \leq 60$	50	6
	$60 < d \leq 80$	70	7
(b)	38km		
(c)(i)	$\frac{4}{15}$		
	$\frac{13}{30}$		
7 (a) (i)	ΔQUR is similar to $\Delta WUS/\Delta WQP$.		
(ii)	8cm		
(b) (i)	ΔWSU is similar to $\Delta WPQ/\Delta QRU$.		
(ii)	10cm		
8 (a)	$7392cm^2$		
(b) (i)	$22176cm^3$		
(ii)	$n = 3$		

Question 9

x	0	1	2	3	4	5	6
$y = 6 + 5x - x^2$	6	10	12	12	10	6	0

Scale

x-axis: 2 cm rep 1 metre
y-axis: 2 cm rep 2 metres



7(c)(i) When horizontal distance is 1.5m, vertical height is 11.3m (± 0.2)

(ii) Greatest height reached by ball = 12.2m (± 0.2)

(iii) Horizontal distance from building where ball first strikes ground = 6m

(iv) Horizontal distance travelled by ball = $4.35 - 0.75$
= 3.6m (± 0.1)