The City School

Unified Mid-Year Examinations

2018 - 2019

Class 10

SCHOOL NAME	
INDEX NUMBER	
DATE	

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **2 hours**

Candidates answer on the Question Paper.
Additional Materials: Geometrical Instruments

READ THESE INSTRUCTIONS FIRST

Write your School name, Index number and Date in the spaces provided.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use paper clips, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Essential working must be shown for full marks to be awarded.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

At the end of the examination, fasten all your work securely together.
The number of marks is given in bracket [ ] at the end of each question or part question.
The total number of marks for this paper is 80.

Invigilated By: _____ Checked By:_____ Marks Tailed By: _____

This document consists of **17** printed pages and **3** blank pages.

1. Given that P = {a, b, c, d, e, f}, Q = {a, e, i, o, u}, find the value of n(P) + n(Q).

Answer..... [2]

2. If ε = {x: x is an integer, $12 \leq x \leq 39$}, A = {x : x is a multiple of 5}, B = {x : x is a perfect square} and C = {x : x is odd}, list the members of

(a) $A \cap B$

Answer.....[1]

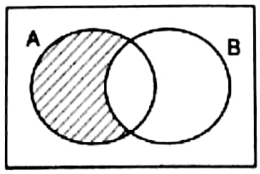
(b) $B \cup C$

Answer..... [1]

3. (a) If ε = {x : x is an integer, $1 \leq x < 10$} and A = {2, 4, 6, 8}, find n(A').

Answer..... [2]

(b) Write set notation to describe the shaded region.



Answer..... [1]

4. **(a)** Given that $f(x) = x + 4$, find the value of $f(-2)$.

Answer..... [1]

(b) Given that $g(x) = 3x - 2$, find x if $g(x) = 7$

Answer..... [2]

(c) Given that $h(x) = 2 - x$, find the value of $h(1/2)$.

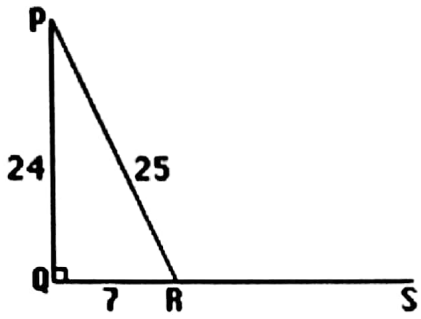
Answer..... [1]

5. In the diagram QRS is a straight line. PQ = 24 cm, QR = 7 cm and PR = 25 cm.

(a) Explain why $P\hat{Q}R = 90^0$.

Answer..... [1]

(b) Express each of the following as a fraction and write down the value of



(i) $sin\ Q\hat{P}R.$

Answer..... [1]

(ii) $tan\ P\hat{R}Q.$

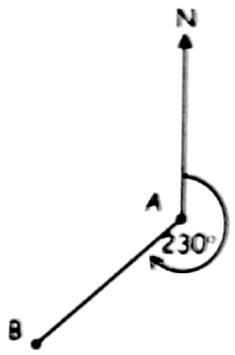
Answer..... [1]

(iii) $cos\ P\hat{R}S.$

Answer..... [1]

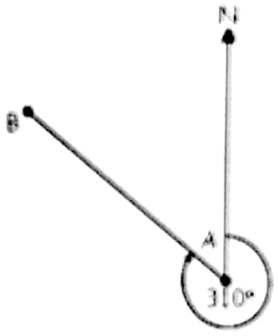
6. Find the bearing of A from B

(a)



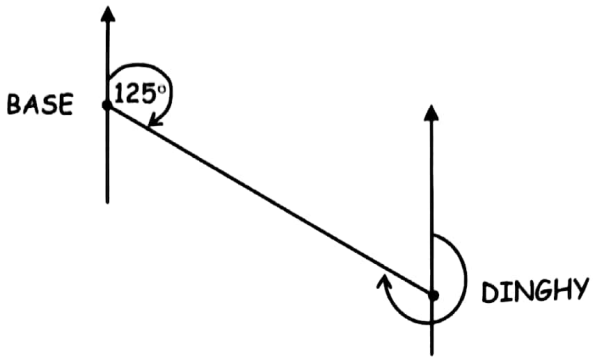
Answer..... [1]

(b)



Answer..... [1]

(c) A rescue helicopter flies on a bearing of 125° to find a dinghy. Find the bearing of BASE from DINGHY.



Answer..... [2]

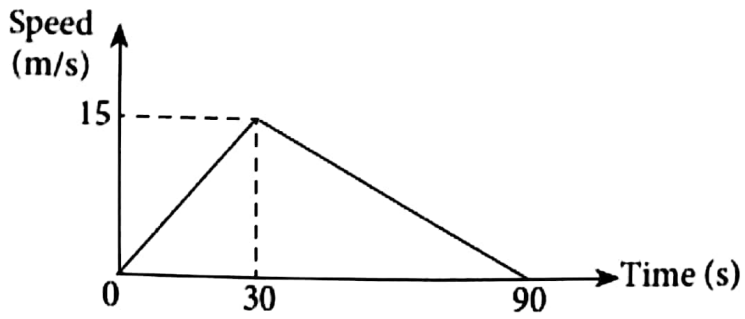
7. **(a)** Given that sin 30° = 0.5, find the exact value of sin obtuse in fraction.

Answer..... [1]

(b) Given that $\cos 30^o = \frac{\sqrt{3}}{2}$, find the value of $\cos 150^o$ in fraction.

Answer..... [1]

8. The diagram is the speed-time graph of a bus starting from rest. The bus accelerated at a constant rate for 30 seconds, reaching a speed of 15 m/s. The driver then braked so that the bus came to rest in a further 60 seconds.



Calculate

(a) the acceleration of the bus during the first 30 seconds,

Answer..... [2]

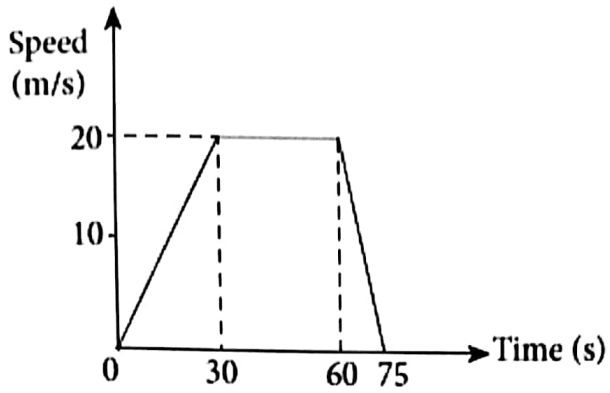
(b) the total distance travelled during the 90 seconds,

Answer..... [2]

(c) the average speed during the 90 seconds.

Answer..... [2]

9. The diagram shows a speed-time graph of a car.



Calculate

(a) the acceleration of the car during the first 30 seconds,

Answer..... [2]

(b) the total distance the car travels from rest before it begins to decelerate,

Answer..... [2]

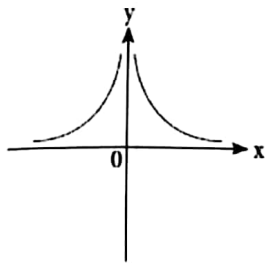
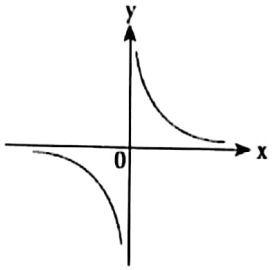
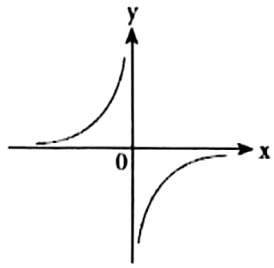
(c) the deceleration of the car during the last 5 seconds of its motion,

Answer..... [2]

(d) convert 20 m/s into kilometer per hour.

Answer..... [1]

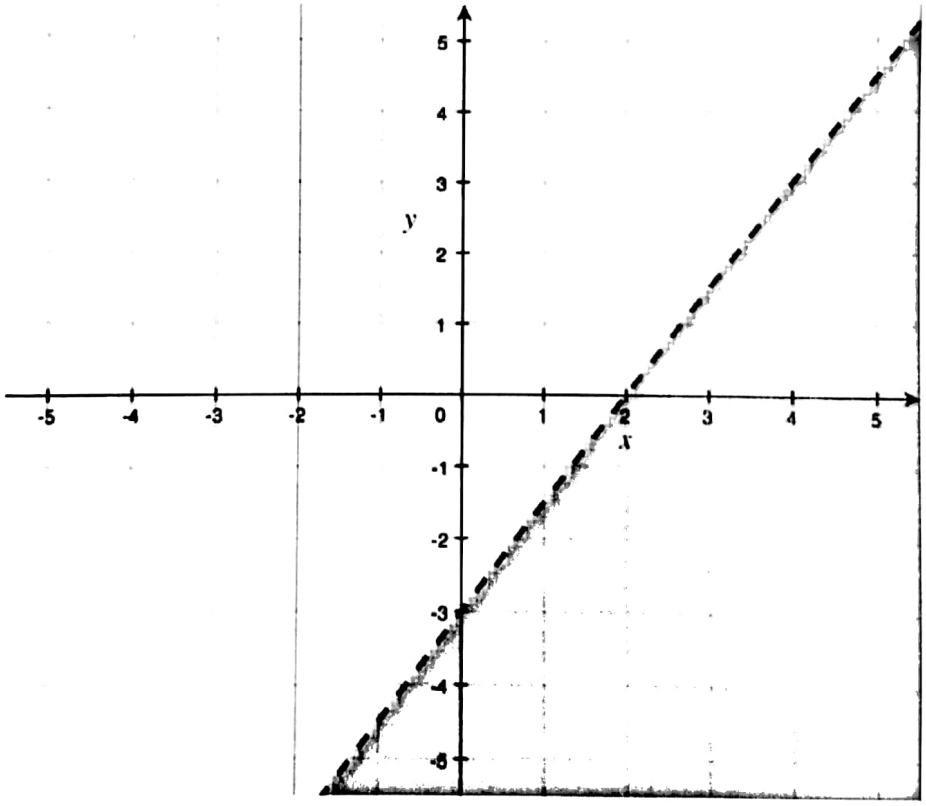
10. Which of the following could be the graph of $y = a/x$, where $a < 0$

(a)	(b)	(c)
		

Answer..... [1]

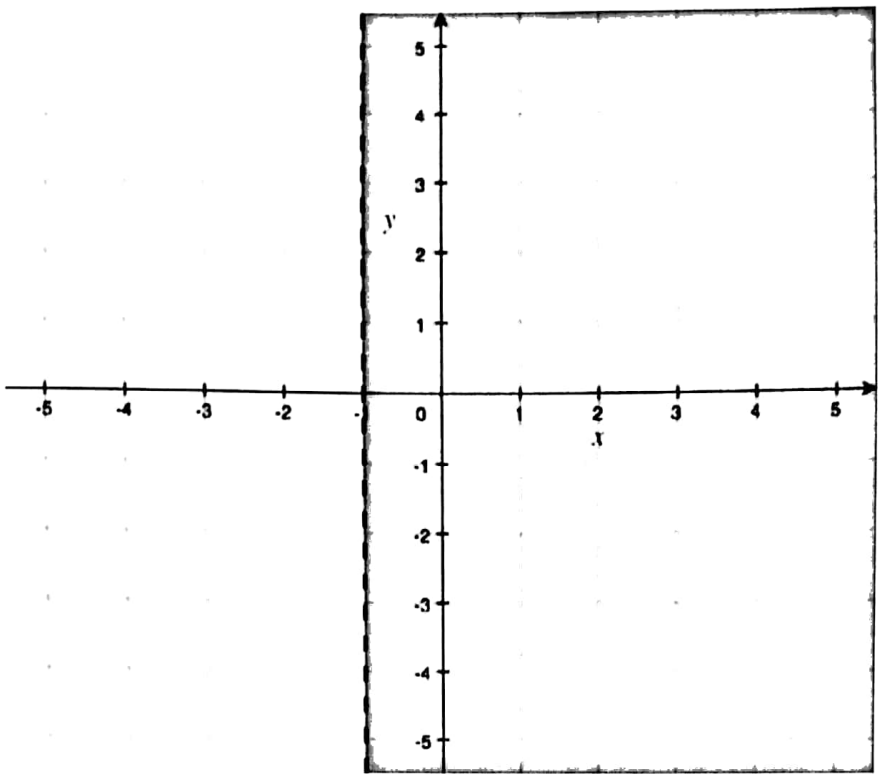
11. State the inequality which defines the unshaded area

(a)



Answer..... [2]

(b)



Answer..... [2]

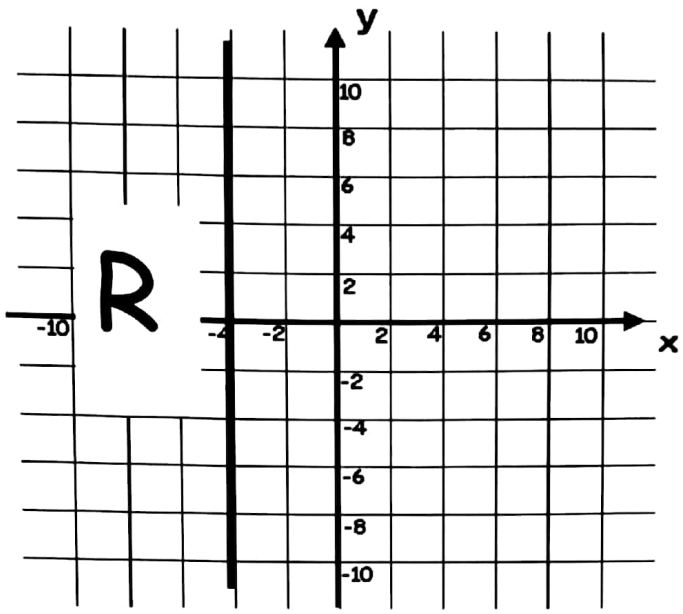
12. There are 30 people in a group. 17 own a car. 11 own a bicycle. 5 do not own neither a car nor a bicycle.

Find how many people in this group own a car but not bicycle?

Answer..... [3]

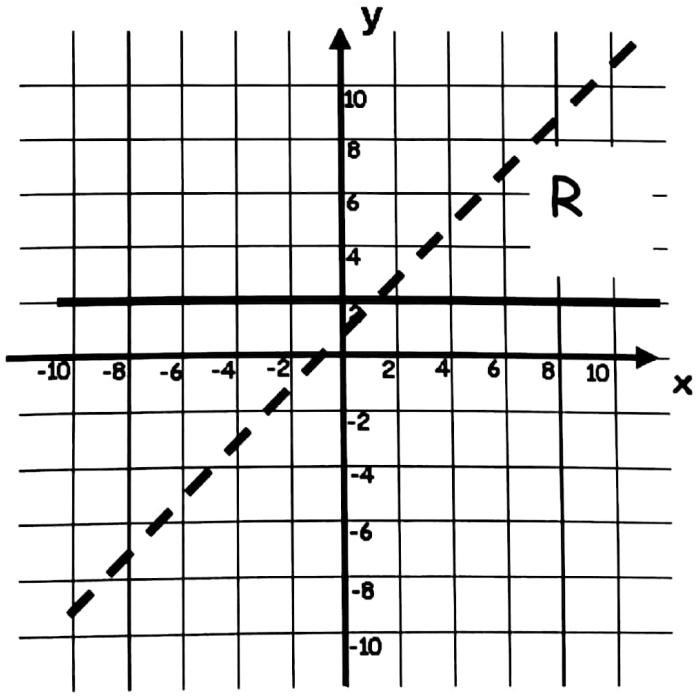
13. State the inequalities, which define the region (R).

(a)



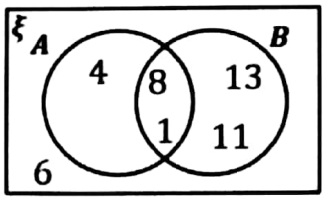
Answer..... [1]

(b)



Answer..... [2]

14. The following Venn diagram is given.



List the numbers in

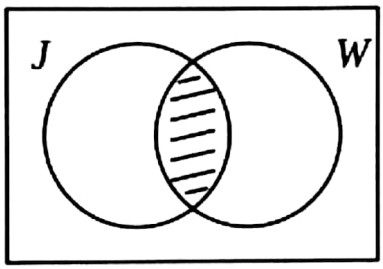
(a) AUB

Answer..... [2]

(b) A'

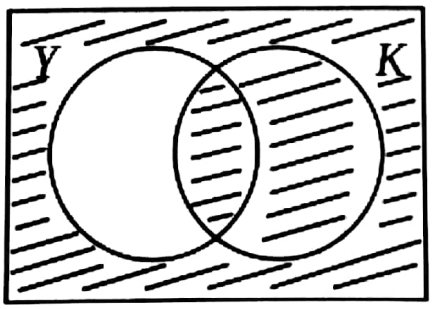
Answer..... [1]

15. (a) Write the set notation to describe the shaded regions in the Venn diagrams.



Answer..... [1]

(b)



Answer..... [1]

16. If $n(A) = 24$, $n(B) = 10$, $n(\varepsilon) = 32$, find the greatest and least values of the following

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

Answer..... [2]

(b) $n(A \cup B)$

Answer..... [2]

17. If A and B are disjoint sets such that $n(A) = 55$ and $n(B) = 12$, find

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

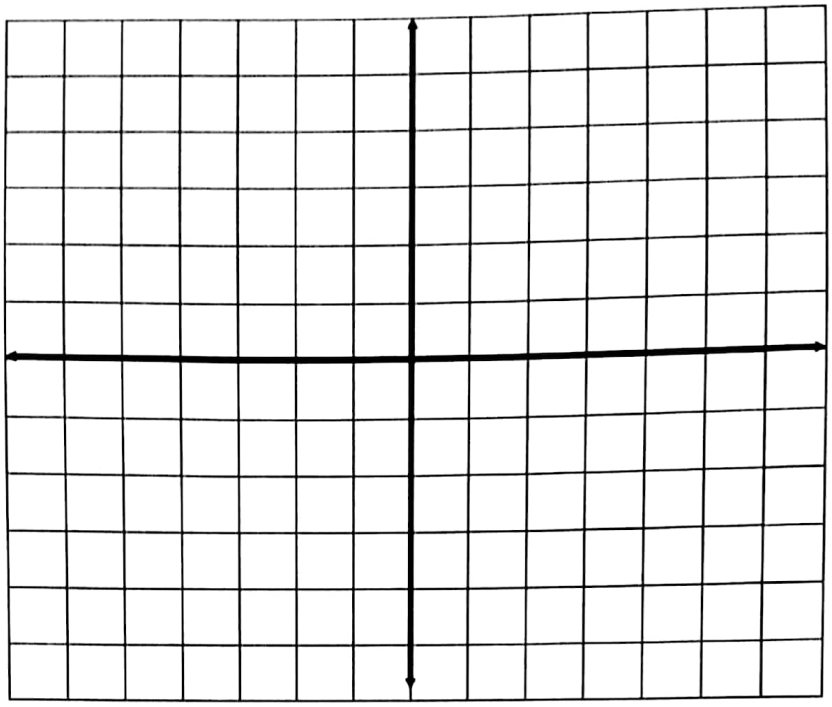
Answer..... [2]

(b) $n(A \cup B)$

Answer..... [2]

18. Show, unshaded, the regions satisfied by the following inequalities:

$x > 0, y < x, y \leq 1$



[4]

19. (a) A function f is defined by $f: x \to 6x - 1$. Find the inverse function $f^{-1}(x)$.

Answer..... [2]

(b) (i) Given the function $f(x) = \frac{3x}{2x-1}$ where $x \neq \frac{1}{2}$, find $f^{-1}(x)$ and state the value of x for which $f^{-1}(x)$ is not defined.

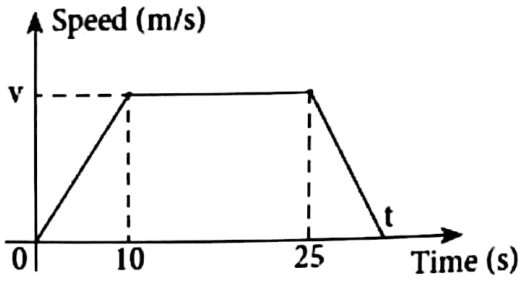
Answer: $f^{-1}(x) =$.....[2]

Answer: value of $x =$.....[1]

(ii) Hence evaluate $f^{-1}(4)$.

Answer..... [2]

20. The diagram shows the speed-time graph of a car which accelerates uniformly from rest at a rate of 2m/s2 for 10 seconds to reach at a speed of v m/s. The car then continues at this speed for another 15 seconds before the brakes are applied. Given that the rate of acceleration is half the rate of deceleration, calculate



(a) the value of v,

Answer..... [1]

(b) the distance travelled during the first 20 seconds,

Answer..... [2]

(c) the distance travelled during deceleration,

Answer..... [2]

(d) the average speed for the whole journey.

Answer..... [2]

21. $\varepsilon = \{x: x \text{ is an integer and } 1 \leq x \leq 19\}$, A = $\{x: x \text{ is a prime number}\}$,

B = $\{x: x \text{ is a multiple of 3}\}$.

(a) Draw a Venn diagram to illustrate this information.

Answer..... [2]

(b) List the elements contained in the set $A' \cup B$.

Answer..... [2]