

The City School

Unified Mid-Year Examinations

2018 - 2019

Class 10



SCHOOL NAME

INDEX NUMBER

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DATE

MATHEMATICS (SYLLABUS D)

Paper 2

4024/22

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments
Electronic calculator

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 should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π , use either your calculator value or 3.142, unless the question required the answer in terms of π .

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 100.

Invigilated By: _____

Checked By: _____

Marks Talled By: _____

This document consists of **21** printed pages and **3** blank pages.

Section A

1. Use the graph to answer this question.

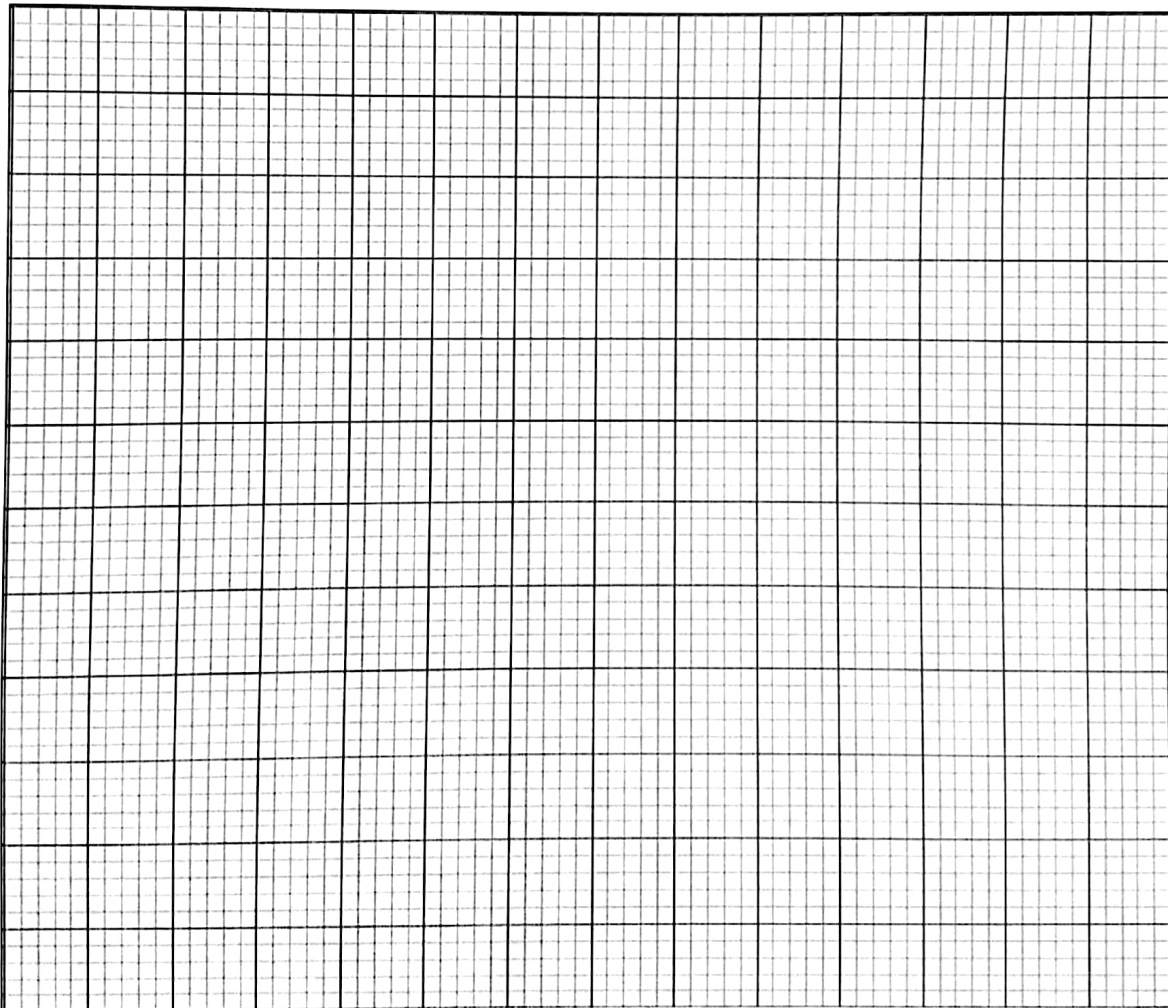
The variables of x and y are connected by the equation $y = 8 + 7x - x^2$. Some of the corresponding values of x and y are given in the following table.

x	-1	0	1	2	3	4	5	6	7	8
y	0	8	14	18	h	20	18	14	8	0

(a) Calculate the value of h .

Answer.....[1]

(b) Using a scale of 2 cm to represent 1 unit on the x -axis and 1 cm to represent 1 unit on the y -axis, draw the graph of $y = 8 + 7x - x^2$ for $-1 \leq x \leq 8$.



[3]

(c) Write down the equation of line of symmetry of the curve $y = 8 + 7x - x^2$.

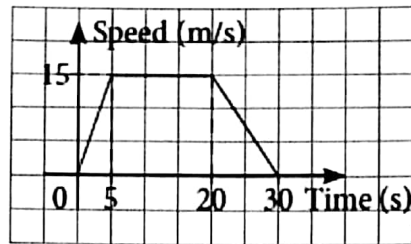
Answer..... [2]

(d) By drawing a suitable straight line on your graph solve the equation

$$7x - x^2 = 2x - 3$$

Answer..... [3]

2. The diagram shows the speed-time graph of a car over a speed of 30 seconds.



(a) Calculate

(i) The acceleration of the car,

Answer..... [1]

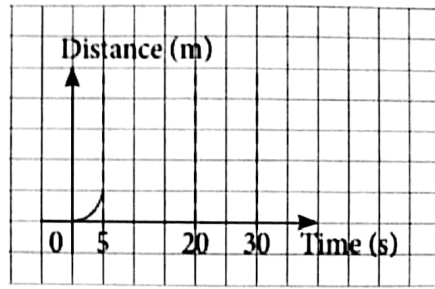
(ii) The speed of the car at $t = 24$ seconds,

Answer..... [2]

(iii) The average speed of the car during the 30 seconds.

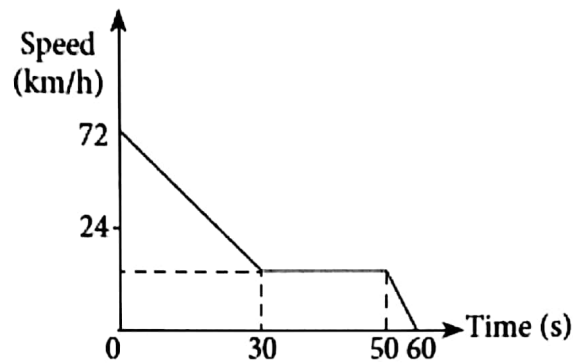
Answer..... [3]

(b) Sketch the distance-time graph for the journey on the given graph.



[2]

(c) The diagram shows the speed-time graph of a train.



Calculate

(i) Acceleration of the train, during the first 30 seconds, giving your answer in m/s^2 ,

Answer..... [2]

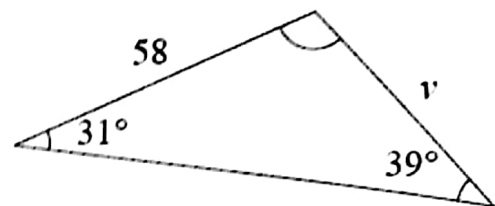
(ii) The total distance covered in the first 60 seconds,

Answer..... [2]

(iii) The average speed of the train, giving your answer in m/s.

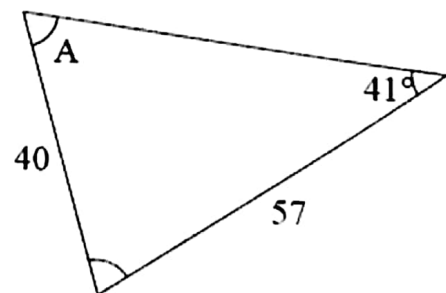
Answer..... [2]

3. (a) Find the value of v correct to 3 significant figures.



Answer..... [3]

(b) Find the angle \hat{A} correct to one decimal place.

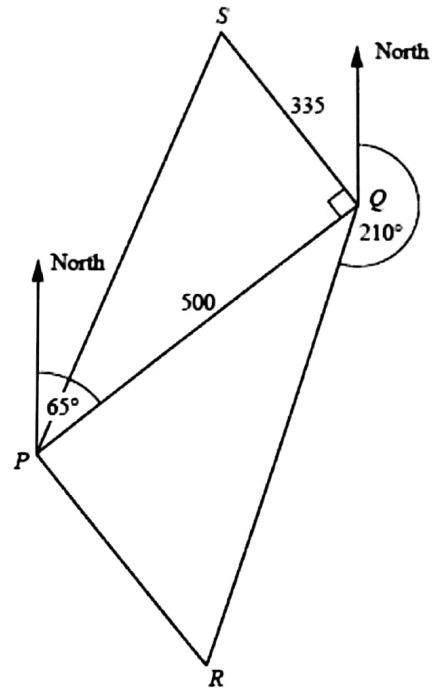


Answer..... [3]

(c) The diagram shows the positions, P , Q , R and S , of four hotels.

The bearing of Q from P is 065° and the bearing of R from Q is 210° .

$PQ = 500$ m, $SQ = 335$ m and $\widehat{PQS} = 90^\circ$.



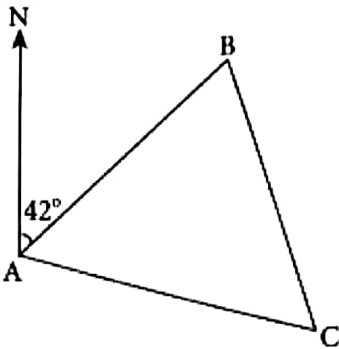
(i) Calculate the shortest distance from P to QR .

Answer..... [2]

(ii) Calculate the bearing of S from P .

Answer..... [3]

4. In the figure, the points A , B and C form an equilateral triangle, and the bearing of B from A is 042° . Find



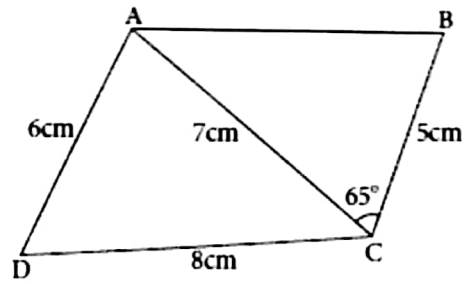
(a) the bearing of C from A ,

Answer..... [1]

(b) the bearing of C from B .

Answer..... [2]

(c) In the diagram, $ABCD$ is a quadrilateral in which $AD = 6$ cm, $DC = 8$ cm, $AC = 7$ cm, $BC = 5$ cm and $\hat{ACB} = 65^\circ$. Calculate



(i) \hat{ACD} .

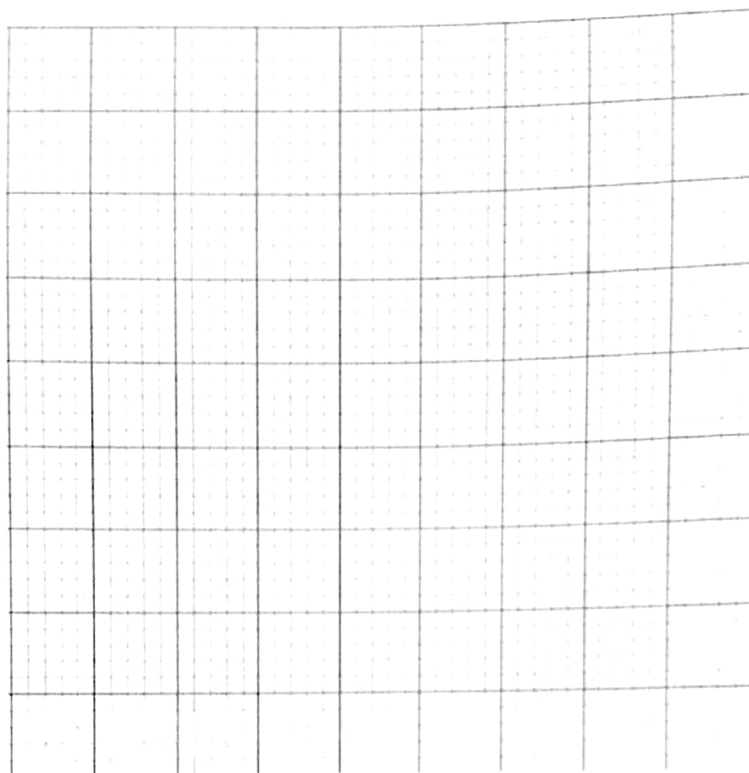
Answer..... [2]

(ii) the area of the triangle BCD .

Answer..... [2]

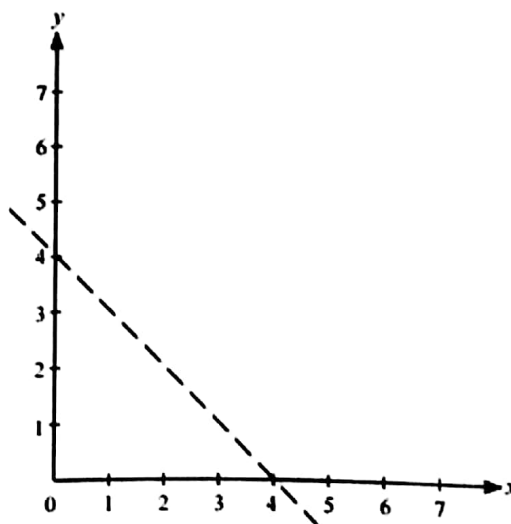
5. (a) On a suitable set of axes, show by unshading the region which satisfy the inequalities given below.

$$x \geq 4 \text{ and } y < -2$$



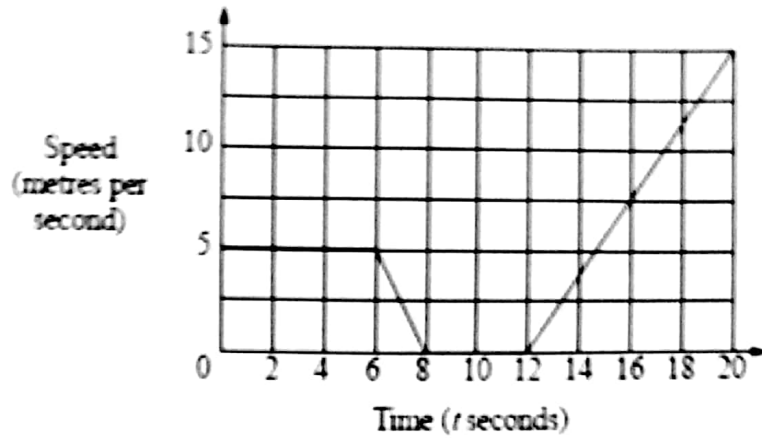
[2]

- (b) Write down the inequality which satisfies the unshaded region.



Answer..... [1]

(c) The diagram is the speed-time for the first 20 seconds of a journey.



Find

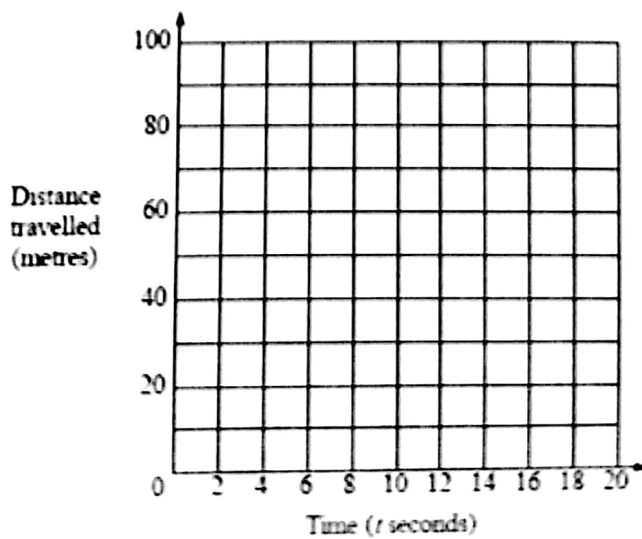
(i) The acceleration when $t = 16$.

Answer..... [1]

(ii) The distance travelled in the first 20 seconds

Answer..... [1]

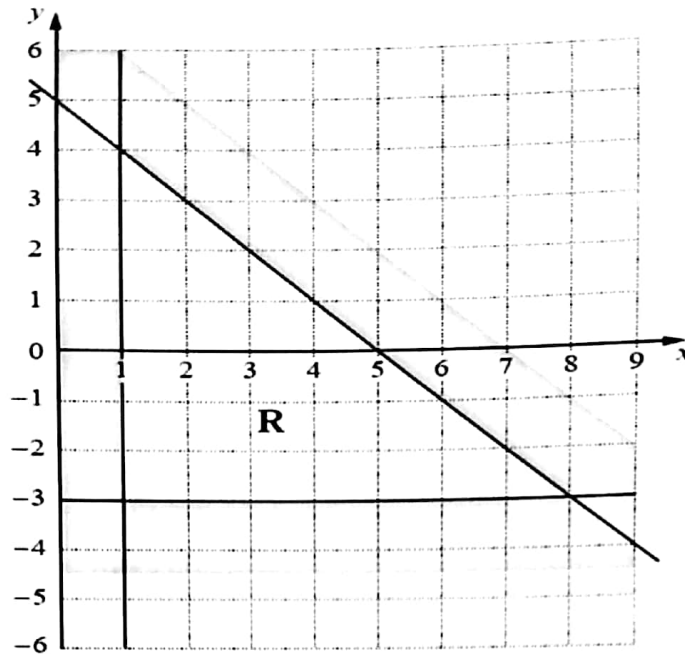
(d) On the grid, sketch the distance-time graph for the same journey.



[3]

(e) The unshaded region R is defined by 3 inequalities.

One of these is $x \geq 1$. Write down the other two inequalities.



Answer.....,[2]

Section B

6. Use graph to answer this question.

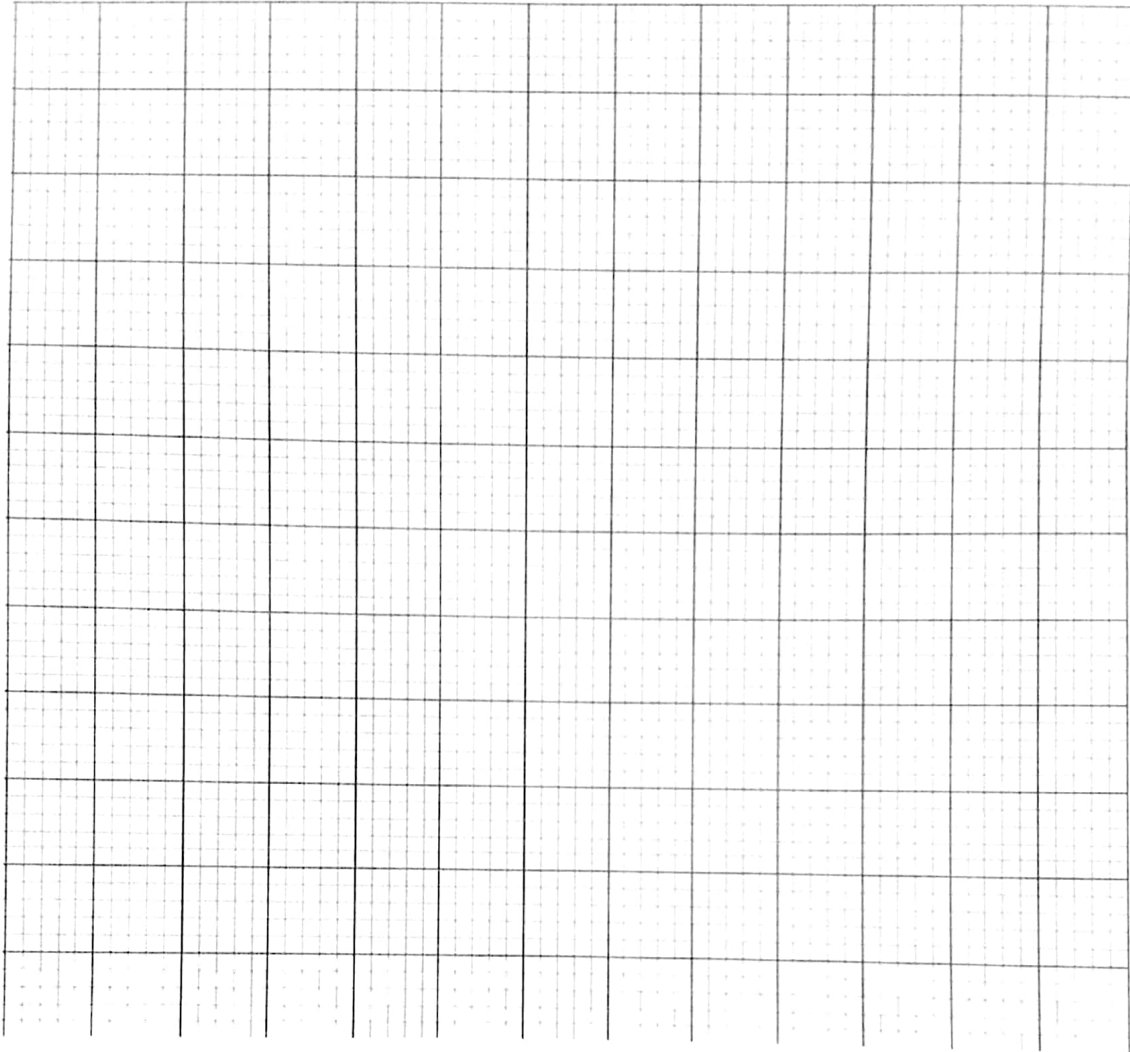
The table below shows some values of x and the corresponding values of y , correct to one decimal place, for $y = \frac{4}{5} \times 2^x$

x	-2	-1	0	1.5	2	2.5	3	3.5	4
y	p	0.4	0.8	1.6	3.2	4.5	6.4	9.1	12.8

(a) Calculate p .

Answer..... [1]

- (b) Using a scale of 2 cm to represent 1 unit, draw a horizontal x – axis for $0 \leq x \leq 4$.
 Using a scale of 2 cm to represent 2 units, draw a vertical y – axis for $0 \leq y \leq 14$.
 On your axes, plot the points given in the table and join them with a smooth curve.



[3]

- (c) As x decreases, what value does y approach?

Answer..... [1]

- (d) By drawing a tangent, find the gradient of the curve at the point (3, 6.4).

Answer..... [2]

(e) (i) On the axes used in part (b), draw the graph of $y = 8 - 2x$.

[2]

(ii) Write down the coordinates of the point where the line intersects the curve.

Answer..... [1]

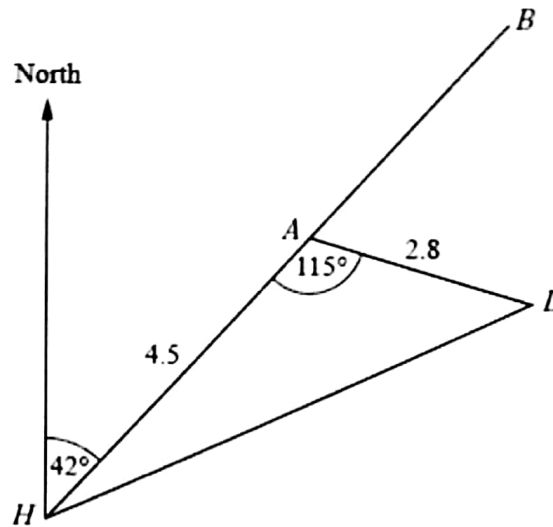
(iii) The x coordinate of the point of intersection satisfies the equation

$$2^x = Ax + B.$$

Find the value of A and value of B .

Answer..... [2]

7. The diagram shows the positions of a harbour, H , a lighthouse, L , and two buoys A and B . HAB is a straight line. The bearing of A from H is 042° . $HA = 4.5$ km, $AL = 2.8$ km and $HAL = 115^\circ$



(a) Find the bearing of

(i) H from A .

Answer..... [2]

(ii) L from A .

Answer..... [2]

(b) Calculate

(i) HL ,

Answer..... [4]

(ii) The area of triangle HAL .

Answer..... [3]

(c) A boat sailed from the harbour along the line HAB .

(i) Calculate the shortest distance between the boat and the lighthouse.

Answer..... [2]

(ii) The boat sailed at a constant speed of 3 m/s. Given that the boat reached A at 07:15, find at what time it left the harbour.

Answer..... [2]

8. (a) If $\xi = \{x : x \in \mathbb{N}, x < 20\}$

$A = \{x : x \text{ is an odd number, less than } 20\}$

$B = \{x : x \text{ is a prime number, less than } 20\}$

Draw a Venn diagram to show the relation between these sets.

Answer..... [2]

(b) If $n(A \cup B) = 50$, $n(A \cap B) = 7$ and $n(A) = 13$, find the value of $n(B)$ with the help of a Venn diagram.

Answer..... [3]

(c) If $n(A) = 22$, $n(B) = 5$ and $n(A \cap B) = 13$, state the value of $n(A \cup B)$.

Answer..... [3]

9. (a) It is given that $\varepsilon = \{x: x \text{ is a real number, } -30 \leq x \leq 22\}$, $A = \{x: 8 \leq x \leq 22\}$, $B = \{x: -20 < x \leq 20\}$, find $A \cap B$.

Answer..... [3]

- (b) In a class of 27 pupils, 22 of them had forgotten to bring their compasses and 18 of them had forgotten their protractors. If all the pupils forgot to bring at least one of the instruments, how many pupils had forgotten to bring both instruments?

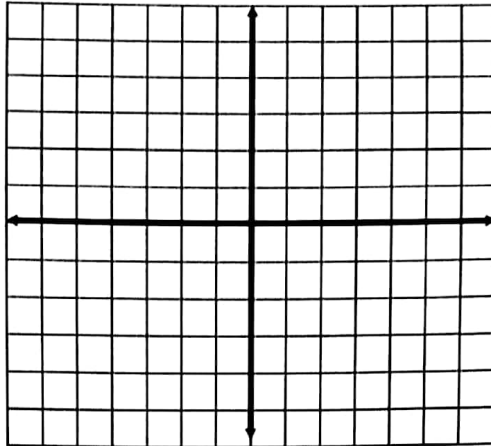
Answer..... [3]

- (c) A random spot check found that 9 pupils did not have a school badge, 12 of them did not wear proper school shoes and 3 had committed both offences. If there are 39 pupils altogether in the class, how many of them did not commit any of the offences?

Answer..... [3]

(d) Show, unshaded, the regions satisfied by the following inequalities.

$$x > 0, 2x + y \leq 10, y \leq 6$$



Answer..... [5]