Answer all the questions.

1. Write the following numbers in ascending order.

   $0.953 \qquad \frac{1}{7} \qquad \sqrt{0.032} \qquad 0.47^{\frac{3}{4}}$

   Answer _____, _____, _____, _____ [1]

2. (a) Calculate $\frac{4.695^3}{\sqrt[3]{54}-2.97}$

   Write down the first 4 digits of your answer.

   Answer _____[1]

   (b) Write your answer to part 2(a) correct to 2 significant figures.

   Answer _____[1]

3. Slove $8^{2x-3} = 4\sqrt{2}$

   Answer _____[2]

4. Simplify the following, leaving your answer in positive index.

(a) $\left(\frac{a^{\frac{3}{2}}}{2}\right)^{-2}$

Answer _____[1]

(b) $\frac{\sqrt{a}}{(-2a)^3 \times 3a^0}$

Answer _____[1]

5. Express $\frac{2}{2-t} + \frac{3t-5}{t^2-7t+10}$ as a single fraction in its simplest form.

Answer _____[3]

6. Solve the inequality $\frac{x-12}{3} \leq \frac{x-15}{6}$

Answer _____[2]

7. Debby wants to invest $\$100\ 000$ in an investment scheme for a period of 2 years. Bank A offers a compound interest of 5% per annum, coumpounded yearly. Bank B offers a compound intesrest of 4.9% per annum, compounded monthly.

   The financial consultant advices her to invest with bank B. Do you agree with the financial consultant? Why? Show your working clearly.

Answer _____[3]

8. The intensity I , of a given light source is inversely proportional to the square of distance, d. For a given distance of d cm, the intensity is 120 units. Find the value of I when d is halved.

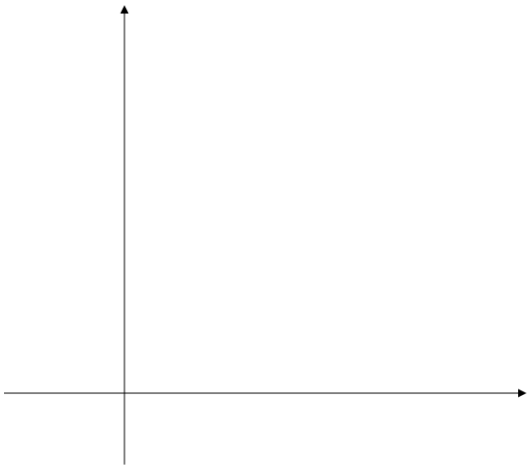
Answer _____[3]

9. (a) Express $x^2 - 6x - 10$ in the form of $(x - a)^2 + b$.

Answer _____[2]

(b) Sketch the graph of $y = x^2 - 6x - 10$.

Answer _____[3]



10. Written as the the product of prime factors, $3500 = 2^2 \times 5^3 \times 7$

(a) Express 720 as a product of its prime factors.

Answer _____[1]

(b) Hence, write down

(i) the largest integer which is a factor of both 3500 and 720,

Answer _____[1]

(ii) the smallest positive integer k for which $720k$ is a multiple of 3500.

Answer _____[1]

11. Factorise completely

(a) $\frac{9}{16}x^2 - 1$

Answer _____[1]

(b) $ab - a - b + 1$

Answer _____[1]

12. ξ = {integers $x : \ 1 \leq x \leq 12$}

A = {even numbers}

B = {multiples of 4}

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

Answer _____[3]

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

Answer _____[2]

13. (a) (i) The n^{th} term of a sequence is given by $(2n-1)^2$. Write down the first 4 terms.

Answer _____[1]

(ii) Explain clearly why all the terms in the sequence can never been even.

Answer _____[1]

(b) The frist 4 terms if another squence are $25,\ 49,\ 81,\ 121\ \ldots\ldots$

By comparing this sequence with your answer in (a)(i), write down the n^{th} term.

Answer _____[2]

14. The gradient of the line joining $A(8, p)$ and $B(-2, 7)$ is 4. Find

(a) the equation of line AB.

Answer _____[3]

(b) the length of AB.

Answer _____[2]

15. $\overrightarrow{AB} = \begin{pmatrix} -2 \\ 6 \end{pmatrix}$ and $\overrightarrow{DC} = \frac{2}{3}\overrightarrow{AB}$.

(a) Express $\overrightarrow{CD}$ as a column vector.

Answer _____[1]

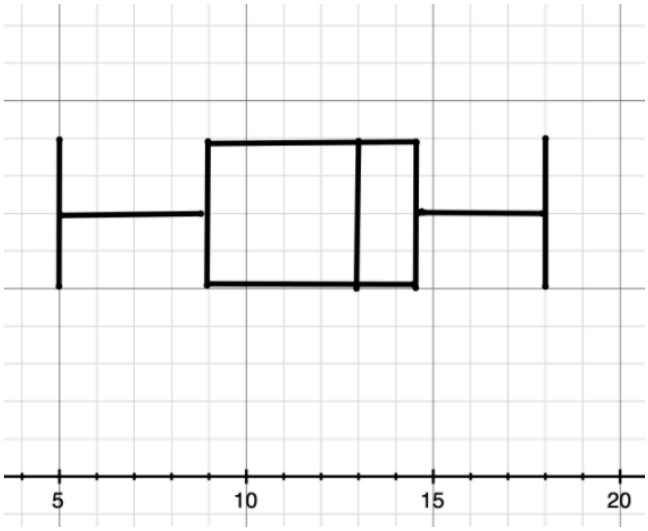
(b) Given that A is the point $(1, -3)$, find the coordinates of B.

Answer _____[1]

(c) What is the special name given to the quadrilateral $ABCD$?

Answer _____[1]

16. The marks obtained by a class of students in a science test are represented by the box-and-whisker plot.



Marks

(a) Find

(i) the median,

Answer _____[1]

(ii) the range,

Answer _____[1]

(iii) the interquartile range.

Answer _____[1]

(b) their marks were arranged in ascending order. Only one student scored 13 marks, and this student was the 15^{th} student in the arranged list.

Calculate the number of students in the class.

Answer _____[1]

17. A beverage shop sells green and jasmine tea, each available in small, medium and large cups.

The matrix A shows the number of cups sold during lunch.

$$\begin{array}{c} \\ \text{Green Tea} \\ \text{Jasmine Tea} \end{array} \begin{array}{c} \begin{array}{ccc} \text{Small} & \text{Medium} & \text{Large} \end{array} \\ \begin{pmatrix} 4 & 8 & 2 \\ 1 & 5 & 0 \end{pmatrix} \end{array}$$

(a) The price for small, medium and large cup are $\$1.2,\ \$1.5,\ \$1.8$ respectively. Write down a 3×1 matrix, M to represent this information.

Answer _____[1]

(b) Evaluate AM.

Answer _____[2]

(c) Explain what the elements of AM represent.

Answer _____[1]

18. Maia's height is $150\ cm$.

    Nika's height is 110% of Ivan's height.

    Nika's height is 96% of Maia's height.

    What is Ivan's height in meters?

Answer _____[3]

19. A bag initially contains 6 blue pens, x green pens abd y red pens. The probability of drawing a blue pen is $\frac{1}{3}$.

    If 3 more green pens are added into the bag and 1 red pen is removed from the bag, the possibility of drawing a red pen from the bag is $\frac{1}{4}$. Find the value of y.

Answer _____[1]

20. The number of a fraction is x and its denominator is y when expressed in its simplest form.

The sum of the numerator and denominator is 21. When 5 is added to the numerator, the fraction becomes 1.

(a) Write down two simultaneous equations, in terms of x and y, to represent this information.

Answer _____[1]

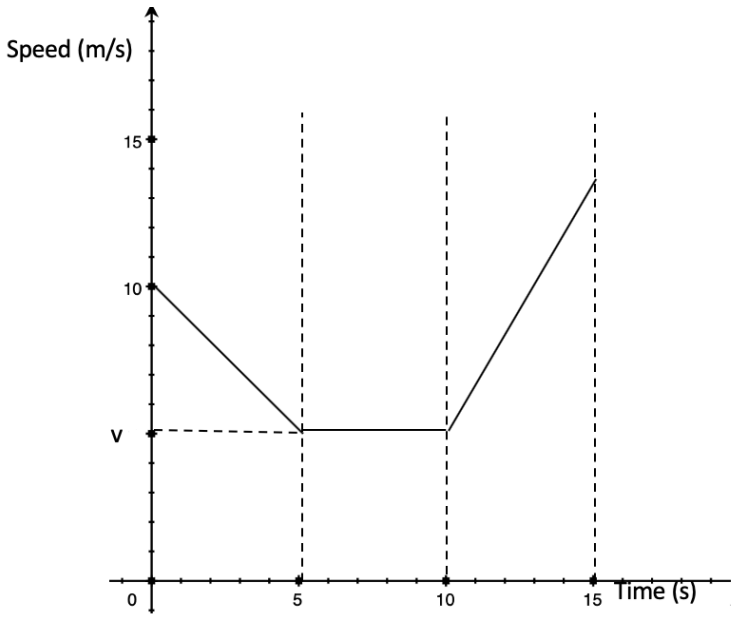
(b) Solve the simultaneous equations.

Answer _____[2]

(c) Hence, state the reciprocal of the original faction.

Answer _____[1]

21. The diagram shows the speed-time graph of a partical over a period of 15 seconds. The particle uniformly decelerated from $10\ m/s$ to $5\ m/s$ in 5 seconds.



It then maintains at its speed for the next 5 seconds and accelerates uniformly at $2\ m/s^2$ for another 5 seconds.

The distance travelled in the first 5 sconds is $35\ m$

(a) Find the value of v,

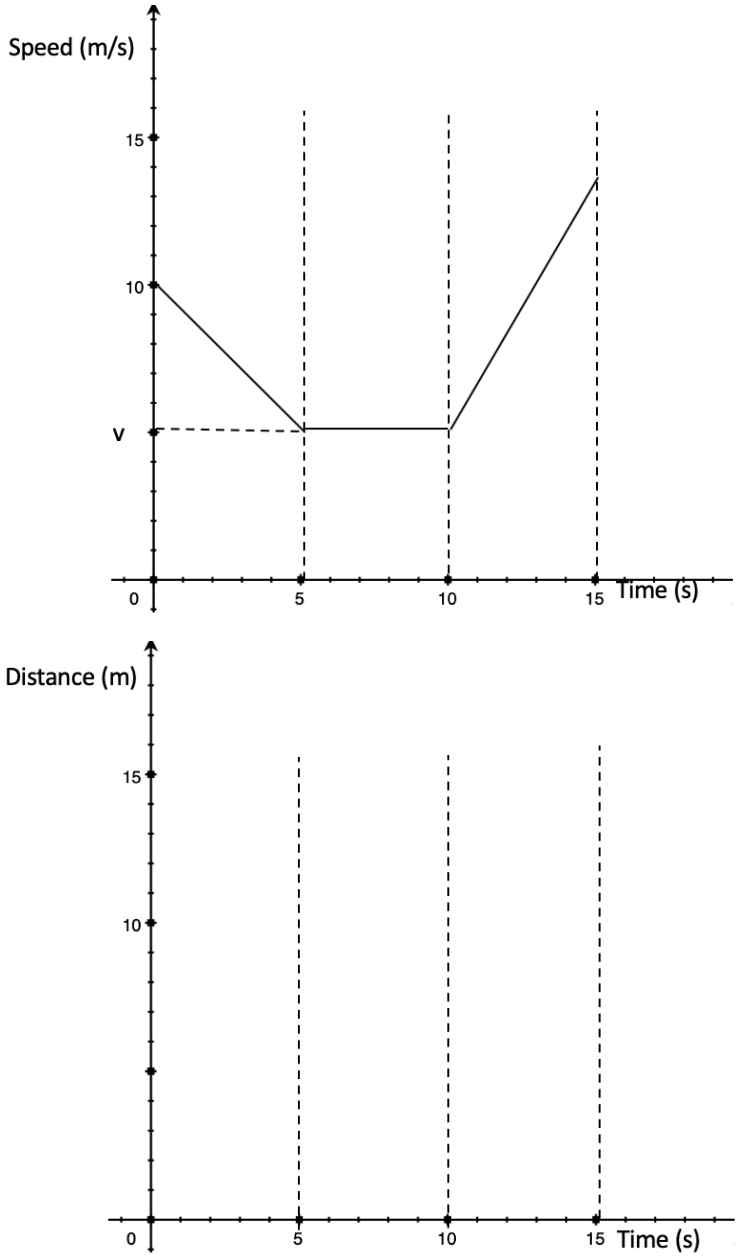
Answer _____[1]

(b) Find the speed of the particle after 15 seconds.

Answer _____[2]

(c) Complete the corresponding distance-time graph.

Answer _____[3]



22. The cash price of a television set is $\$1\ 260$.

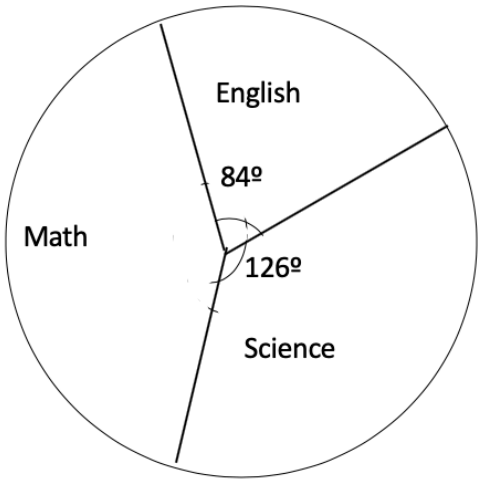
    The hire-purchased scheme requires the buyer to pay a deposit of 20% of cash price plus 18 equal monthly instalments of $\$59.36$.

    Calculate the interest reate oer annum of the hire-purchase scheme.

Answer _____[3]

23. Some students were surveyed on their favourite subject.

The result were represented in the pie chart below.



(a) Caluculate the ratio of the number of students who chose Math to the number of students who chose English.

Answer _____[2]

(b) Calculate the smallest possible number of students who were participated in the survey.

Answer _____[2]

24. (a) Jim travels from town A to town B at constant speed of $u\ km/h$.

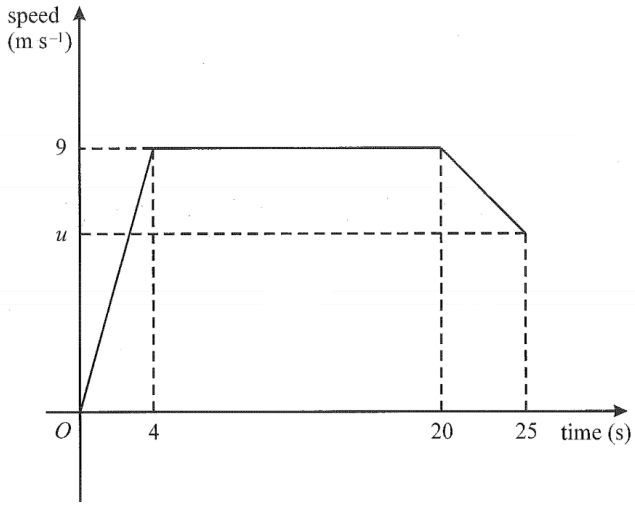
(i) Convert $u\ km/h$ into m/s. Leaving your answer in terms of u.

Answer _____[1]

(ii) Lily sets off from town B for town A at the same time as Jim at $v\ km/h$. Given that the distance between two towns is $250\ km$. Express in therms of u and v , the distance from town A they will meet.

Answer _____[2]

(b) A sprinter runs a race of $200\ m$. His total time for running the race is 25 seconds. Below is a sketch of the speed-time graph for the motion of the sprinter.



Calculate

(i) The acceleration in the first 4 seconds.

Answer _____[2]

(ii) The distance covered by the sprinter in the first 20 seconds of the race.

Answer _____[2]

(iii) The value of u.

Answer _____[2]

~ END OF PAPER ~