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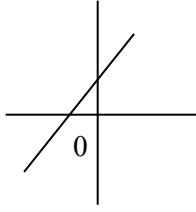


Figure 1

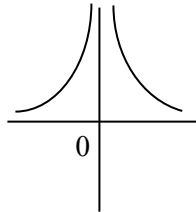


Figure 2

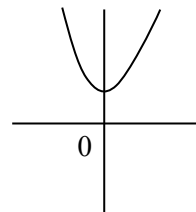


Figure 3

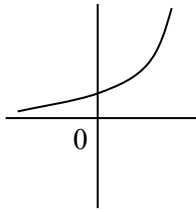


Figure 4

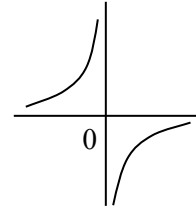


Figure 5

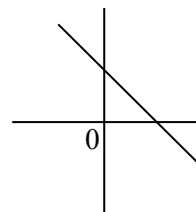


Figure 6

Which of the above could be the graph of

(a) $y = \frac{-1}{x}$

Answer (a) Figure _____ [1]

(b) $y = 1 - x$

Answer (b) Figure _____ [1]

(c) $y = x^2 + 1$

Answer (c) Figure _____ [1]

2 (a) Simplify.

$$y = \frac{8p^4q^5}{32p^3q^6}$$

Answer (a) _____ [2]

(b) The ratio of the approximate distances of the Earth and Uranus from the Sun is 12:225. The ratio of the approximate distances of Uranus and Mars from the sun is 25:2.

If the Earth is 1.5×10^{11} meters away from the sun, determine the distance of Mars from the Sun. Express your answer in standard form.

Answer (b) _____ [3]

- 3 Find the least value of x^2 in $x - 1 \leq 3x + 5 < 8$

Answer _____ [3]

- 4 $ABCD$ is a square of sides $2x$ cm. PQR is a triangle in which $PQ = (3x - 2)$ cm, $QR = (4x + 3)$ cm and $\angle PQR = 90^\circ$.

Given that the area of the square is equal to the area of the triangle,

- (a) form an equation in x and solve for it.

Answer _____ [4]

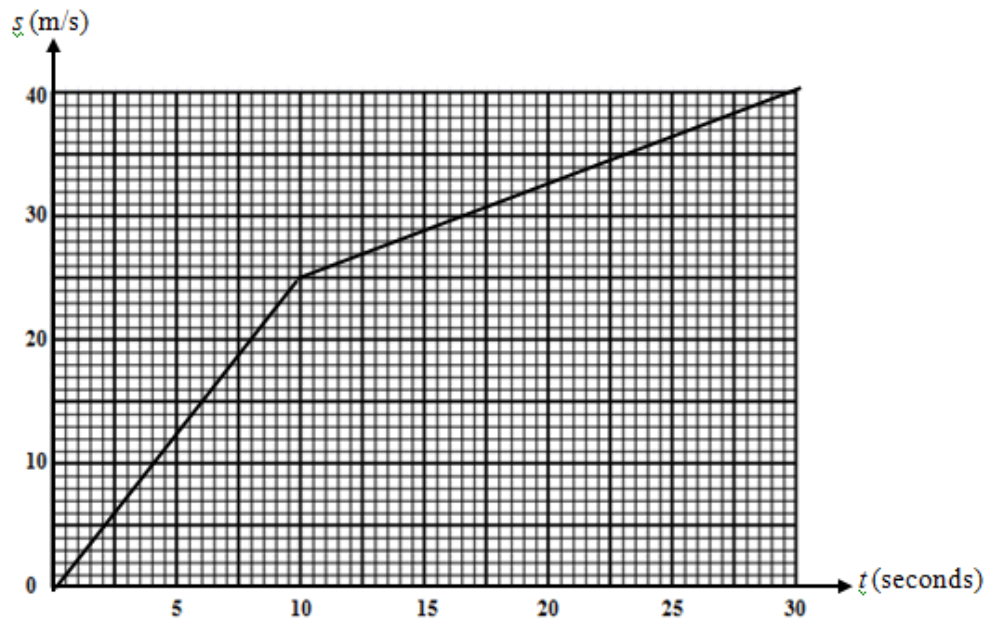
- (b) find the area of the square, giving your answers correct to two decimal places.

Answer _____ [1]

- 5 Mr Kwan borrowed from a finance company to buy a second-hand car. He pays back the loan through monthly installments for a period of 4 years. In the first year, each monthly instalment is \$1 000. For each subsequent year, the monthly installment is reduced by 10% from the previous year. Find the amount of money Mr Kwan paid for the car.

Answer _____ [3]

- 6 The diagram is a speed-time graph of the first 30 seconds of a journey.



Find

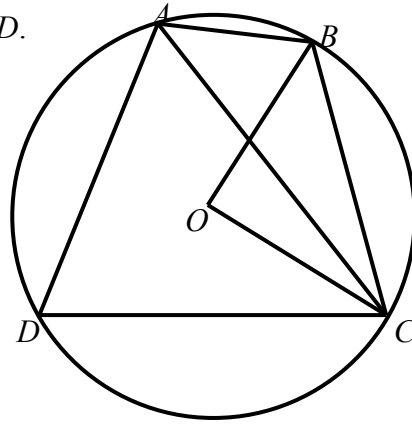
- (a) the acceleration during the first 10 seconds,

Answer (a) _____ [1]

- (b) the average speed of the object.

Answer (b) _____ [3]

- 7 O is the centre of the circle through A, B, C and D .
and $\angle OBA = 62^\circ$.



(a) Calculate

(i) $\angle OCB$

Answer (a)(i) _____ [1]

(ii) $\angle ADC$

Answer (a)(ii) _____ [1]

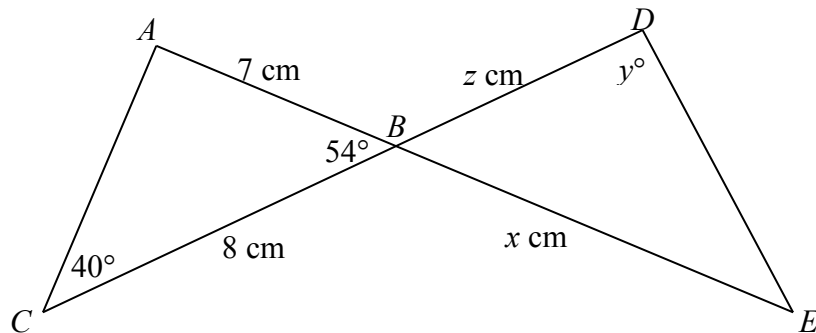
(iii) $\angle BAC$

Answer (a)(iii) _____ [2]

- (b) The radius of the circle is 4.6 cm and $AD = 8$ cm.
How far is the chord AD from the centre of the circle.

Answer (b)(i) _____ [2]

- 8 In the figure below, ABE and CBD are straight lines.



Given that $\triangle ABC$ and $\triangle DBE$ are congruent triangles, determine

(a) The measure of angle DEB

Answer (a)(i) _____ [1]

(b) the values of x, y and z .

Answer (b)(i) _____ [3]

9 Use the rules on indices to solve the equation $\left(\frac{1}{25}\right)^x (125)^{x^2} = (125)^x \left(\frac{1}{25}\right)$

(a) Show that $3x^2 - 5x + 2 = 0$.

[3]

(b) Solve $3x^2 - 5x + 2 = 0$.

Answer (b) _____ [2]

- 10** There are 10 blue balls, some red balls and some yellow balls in a bag. When one ball is selected at random, the probability that it is blue is $\frac{1}{6}$ and the probability that it is yellow is $\frac{1}{5}$.

(a) Find the number of red balls.

[2]

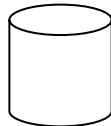
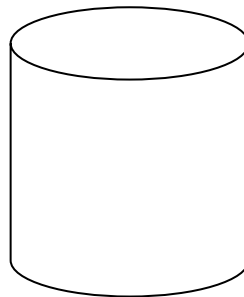
Answer _____

(b) When x red balls are added to the bag, the probability of selecting a yellow ball decreased by $\frac{3}{115}$. Calculate x .

[2]

Answer _____

- 11** The diagrams below show two geometrically similar open cylindrical fuel barrels, X and Y . The height of cylinder X is 1.5 m and that of cylinder Y is 4.5 m.

Cylinder X Cylinder Y

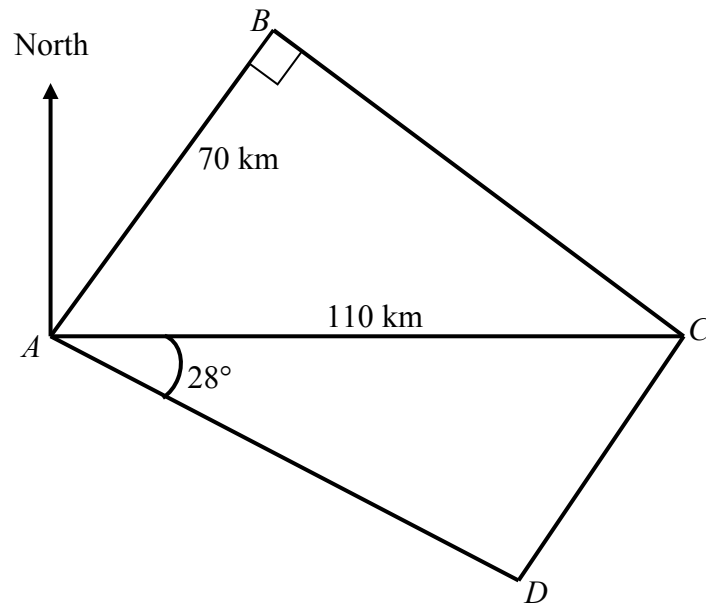
(a) Find the ratio of the volumes of cylinder X to cylinder Y .

Answer (i) [2]

(b) Find the surface area of cylinder Y if the surface area of cylinder X is 800 cm^2 .

Answer (ii) [2]

- 12 The diagram shows four towns A , B , C and D . C is 110 km due east of A . D has a bearing of 230° from C . $\angle ABC = 90^\circ$ and $AB = 70$ km.



- (a) Find the measure of $\angle BAC$.

Answer (a)(i) _____ [2]

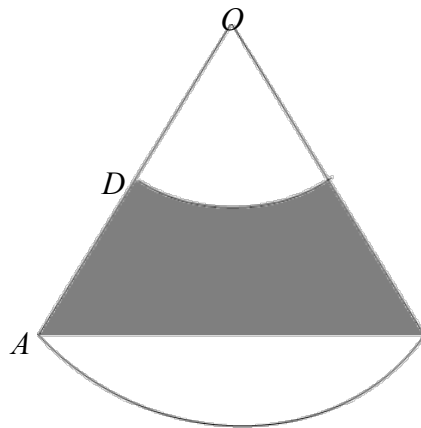
- (b) Calculate the bearing of B from A .

Answer (a)(ii) _____ [1]

- (c) A boat travels from A to B , then from B to C , then from C to D and finally from D to A . Calculate the average speed of the boat given that it left A at 10 05 and arrived back in A at 14 35.

Answer (c) _____ [6]

- 13 The diagram shows two concentric circles with common center at O . The radii of the two circles are 7 cm and 14 cm respectively. Given that $\angle AOB = 60^\circ$, find



- (a) the perimeter **shaded** region.

Answer(c) _____ [3]

- (b) Find the area of the **unshaded** region.

Answer(d) _____ [5]

- 14 There are 10 blue balls, some red balls and some yellow balls in a bag. When one ball is selected at random, the probability that it is blue is $\frac{1}{6}$ and the probability that it is yellow is $\frac{1}{5}$.

(c) Find the number of red balls.

[2]

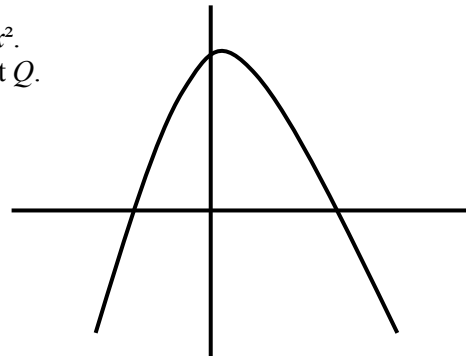
Answer _____

- (d) When x red balls are added to the bag, the probability of selecting a yellow ball decreased by $\frac{3}{115}$. Calculate x .

[2]

Answer _____

- 15 The diagram shows part of the graph of $y = 12 + x - x^2$. The graph cuts the x -axis at P and R , and the y -axis at Q .



(a) Find the coordinates of P , Q and R .

[2]

Answer (a) _____

(b) Express the equation $y = 12 + x - x^2$ in the form $y = a + (b - x)^2$.

[2]

Answer (b) _____

(c) Find the equation of the straight line that must be drawn on the diagram to solve

$$2x - \frac{5}{x} = 0 \quad \text{graphically.}$$

[3]

Answer (d)(ii) _____

- 16 (a) The points A and B are $(-2, 10)$ and $(6, 5)$ respectively.

Find the equation of the line through A and B .

Answer (a)(i) _____ [3]

- (b) The points C and D are $(4, 5)$ and (p, q) respectively.

(i) Write down, in terms of p and q , the coordinates of the midpoint of CD .

Answer (b)(ii) _____ [1]

(ii) Given that the midpoint of CD is the y -intercept of the line $y = 2x + 8$,
find the coordinates of D

Answer (b)(iii) _____ [3]

- 17 The age, x years, of each elderly in a certain old folk home was recorded. The data is shown in the distribution table below.

Age (x years)	Number of people
$55 < x \leq 60$	10
$60 < x \leq 65$	m
$65 < x \leq 70$	48
$70 < x \leq 75$	47
$75 < x \leq 80$	27
$80 < x \leq 85$	15
$85 < x \leq 90$	7

- (a) (i) The estimated mean age of the elders is 71, find the value of m , correct to the nearest whole number.

Answer(a) _____ [3]

- (b) Complete the cumulative frequency table below.

Age (x years)	Cumulative Frequency (y)
$x \leq 55$	
$x \leq 60$	
$x \leq 65$	36
$x \leq 70$	
$x \leq 75$	131
$x \leq 80$	
$x \leq 85$	173
$x \leq 90$	

[3]

- (c) Using a scale of 2 cm to represent 5 units on the x – axis and 2 cm to represent 10 units on the y -axis, **on a separate graph**, draw the cumulative frequency graph of the data. [3]

- (d) From your graph, find the interquartile range.

Answer(a) _____ [1]

- (e) An insurance company grants a one – year premium insurance to an elderly who is at more than 68 years old. Estimate the number of individuals who will be granted the one-year premium insurance.

Answer(a) _____ [2]