Mathematical Formulae

Compound interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Area of a triangle } ABC = \frac{1}{2}ab\sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2}r^2\theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Statistics

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f}$$

$$\text{Standard deviation} = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2}$$

PAPER 1

Answer **all** the questions.

1. (a) Evaluate $\dfrac{3.8\times 42.31}{8.76-12.95}$.

Answer (a) ..…….…… [1]

(b) The closest distance of the Moon from Earth is 363 704 km.
Write 363 704 to the nearest thousand.

Answer (b) ..…….…… [1]

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2. Brian leaves home at 0715 and commutes to work on MRT at an average speed of 60 km/h.
He arrives at his workplace at 0830.
What is the distance between his home and workplace in km?

Answer …….……km [2]

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3. Solve $(x+2)(3x-1)=0$.

Answer x = ……..…… [2]

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4. A desktop computer costs \$1200.

A hire-purchase scheme requires a 10% deposit followed by a monthly instalment for 24 months.

If the total hire-purchase cost is \$1392, what is the monthly instalment?

Answer \$ ...…….…… [2]

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5. (a) Find the smallest number that is divisible by both 16 and 56.

Answer (a) ..……..…… [1]

(b) The square root of k is $2^3 \times 3^2$.

Express k as the product of its prime factors.

Answer (b) ..……..…… [2]

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6. A team of 7 boys has a mean height of 1.74 m.

When Peter joins the group, the mean height becomes 1.76 m.

What is Peter's height?

Answer … ……..…... m [2]

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7. A sphere has a radius of $2x$ centimetres and a volume of 7776 cm^3.
Find x in terms of π.

Answer $x =$ ……..…… [2]

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8. A bumboat to Pulau Ubin can carry x passengers and 2 crew members.

(a) Write an expression for the maximum number of people that can be carried on y bumboats.

Answer (a) ..……..…… [1]

(b) Given that $x = 13$, find the least number of bumboats required to carry 65 people.

Answer (b) ..……..…… [2]

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9. (a) Simplify $\dfrac{(2x)^3}{(3x)^2} \div \dfrac{18x}{27}$.

Answer (a) ……..…… [2]

(b) Expand and simplify $3(2-5y)-4(y-1)$.

Answer (b) ……..…… [2]

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10. (a) Write the following numbers in order of size, starting from the **smallest**.

$$0.74^2, -\frac{7}{4}, -0.\dot{7}\dot{4}, \sqrt{0.74}$$

Answer (a) ……, ……, ……, …… [1]

(b) Given that $243^y = 2187$, find y.

Answer (b) y = ……..…… [2]

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11. (a) Solve the inequality $3x-1\geq 19$.

Answer (a) ..…….…… [1]

(b) Solve $\dfrac{x+1}{2-x}=3$.

Answer (b) x = ……..…… [2]

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12. On a particular map of Singapore, 2 cm represents 0.18 km on actual ground.

(a) Express the scale of the map in the form 1 : n.

Answer (a) 1 : ……..……..… [1]

(b) A playground occupies an area of 50 m^2.

Find its area as represented in the same map in square centimetres.

Answer (b) ……..…… cm^2 [2]

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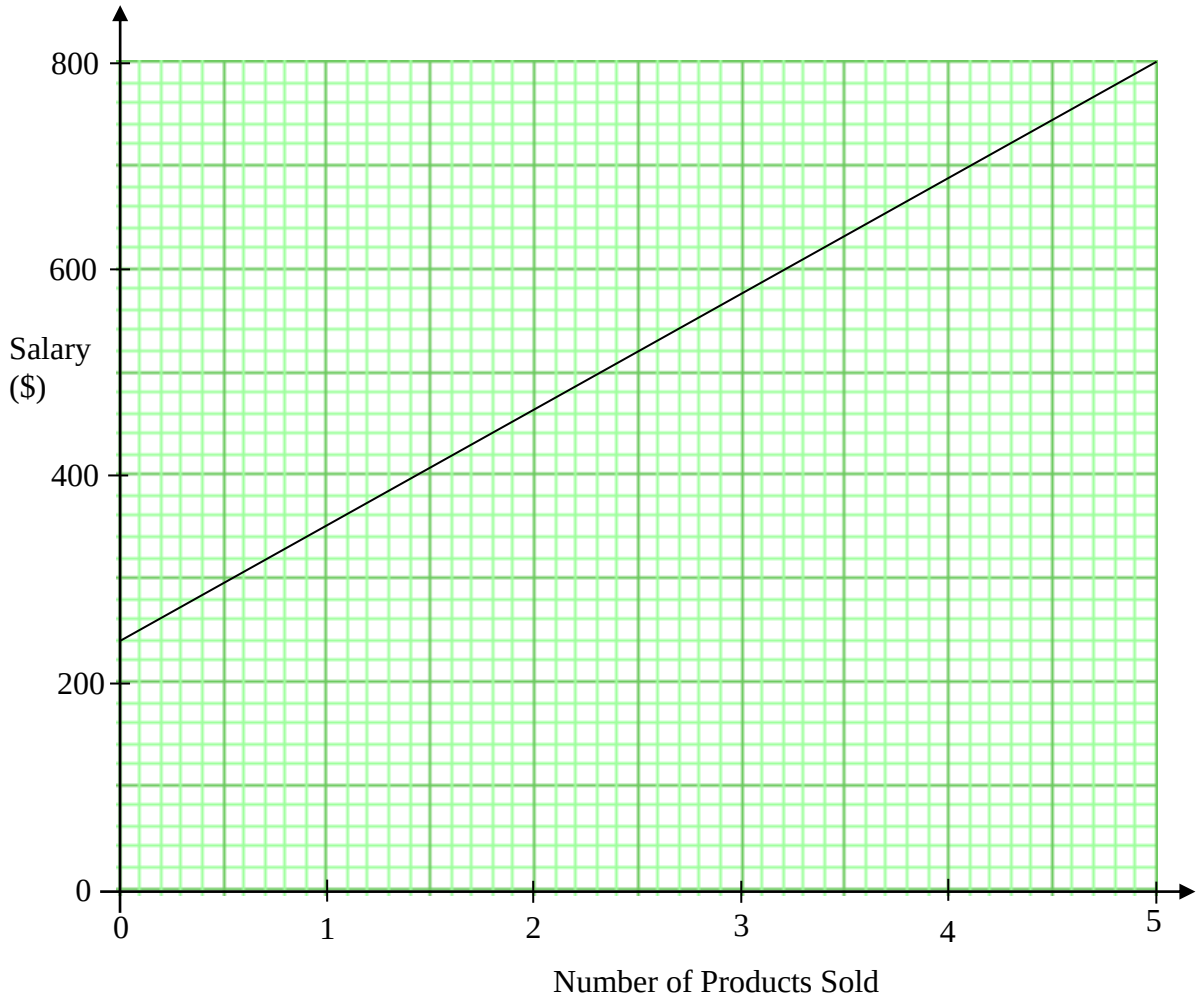
13. The graph shows the salary of a salesman.



(a) How much does the salesman earn if he sold 2 products?

Answer (a) $ ……..…… [1]

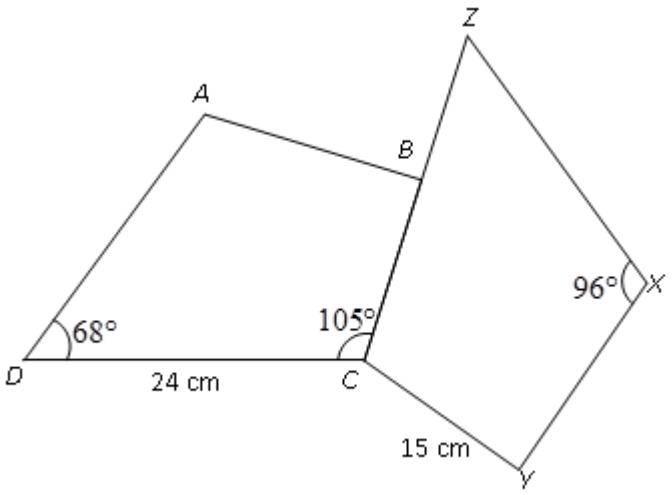
(b) The salesman earns a basic fee $$x$ plus $$y$ per product sold.

Find x and y.

Answer (b) x = ……..….

y = ……..... [2]

14.



In the diagram, quadrilaterals *ABCD* and *XYCZ* are congruent.

Find

(a) $\angle BAD$,

Answer (a) $\angle BAD =$ ……..……° [1]

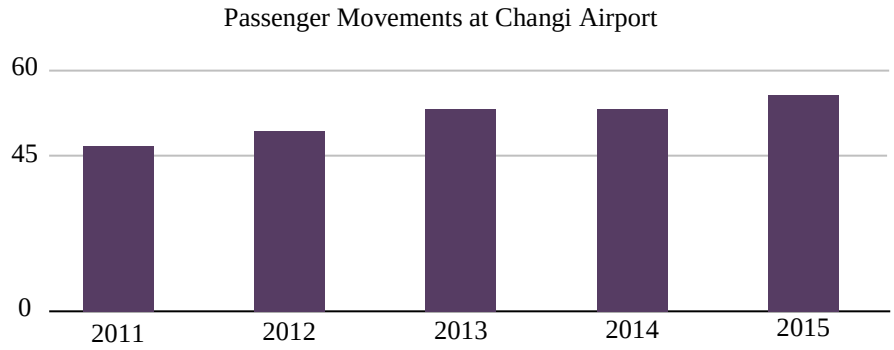
(b) $\angle ABC$,

Answer (b) $\angle ABC =$ ……..……° [1]

(c) the length of *BZ*.

Answer (c) $BZ =$ …….. cm [1]

15. The graph shows yearly passenger movements in Changi Airport, Singapore.



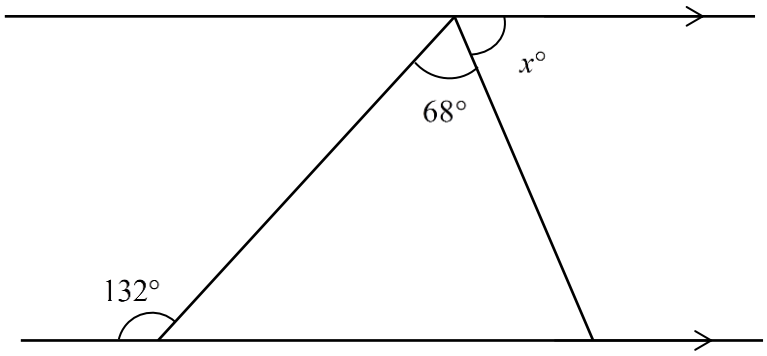
Explain one way in which the graph is misleading.

Answer ……

……

…….. [2]

16.



Calculate the value of x, stating your reasons clearly.

Answer ……

……

…….. [3]

17. $a = 3x - 1$ $b = x + 2$

Write an expression in its simplest form, in terms of x, for

(a) $2(a+3) - 3b$,

Answer (a) ……..…… [2]

(b) $\frac{a}{2} - \frac{b}{3}$.

Answer (b) ……..…… [2]

18. (a) By completing the square, $x^2 - 6x + 1$ can be expressed in the form $(x - p)^2 + q$.

Find p and q.

Answer (a) p = ……..….

q = ……..... [2]

(b) Hence, or otherwise, solve $x^2 - 6x + 1 = 0$.

Give your answers correct to 2 decimal places.

Answer (b) x = ..…… or ..…… [2]

19. (a) The nth term of a sequence is given by $13-4n$.

Write down the first 3 terms of the sequence

Answer (a) ..…… , ..…… , …… [1]

(b) The first 4 terms of a different sequence are

5, 12, 19, 26

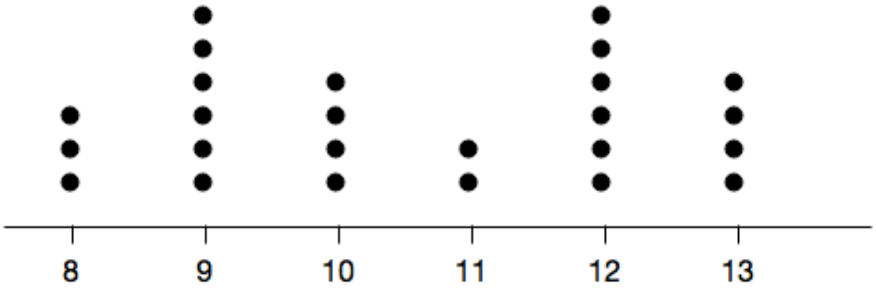
(i) Find an expression for the nth term of this sequence.

Answer (b)(i) ……..……..…… [1]

(ii) Find the 14th term.

Answer (b)(ii) ……..……..…… [1]

20. The dot diagram below shows the amount of pocket money a group of students receive per week.



Dollars per week

(a) How many students are there in the group?

Answer (a) ……..…… [1]

(b) What is the median amount of pocket money?

Answer (b) ……..…… [2]

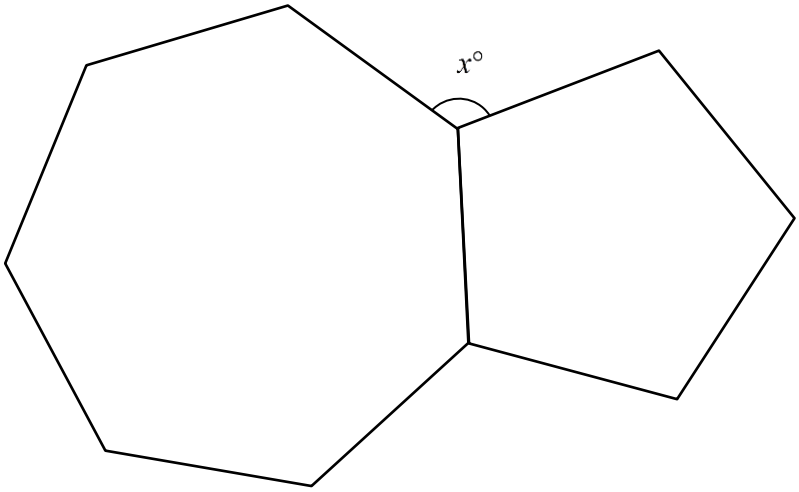
(c) Samuel and Nelson joined the group later and they receive \$8 and \$15 per week respectively. Explain the effect, if any, on the median amount of pocket money.

Answer (c) ……..…….…….……

……..……

……..…….. [2]

21. (a) Calculate the angle, $x°$, between the two regular polygons.



Answer (a) x = ……..…… [2]

(b) Five of the angles in a hexagon are equal.
The sixth angle is half the size of each of the other angles.

Find the size of the smallest angle in the hexagon.

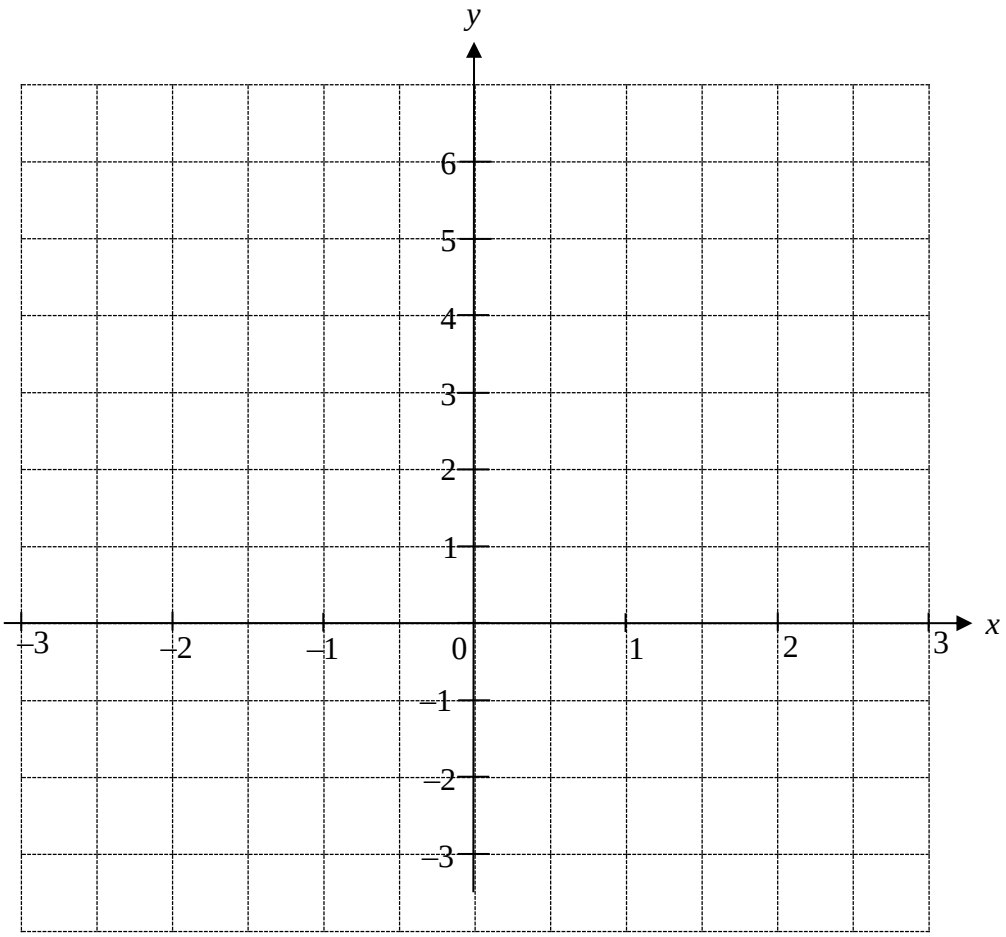
Answer (b) ……..…… [3]

22. (a) Complete the table of values for $y + 2x = 1$.

x	–2	–1	0	1	
y	5	3	1		–3

[2]

(b) On the grid, draw the line $y + 2x = 1$.



[2]

(c) Write down the coordinates of the point where this line crosses the x–axis.

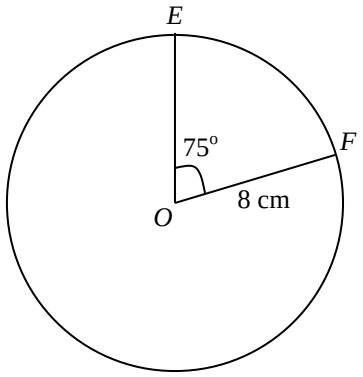
Answer (c) (..... , ...) [1]

(d) Write down the gradient of this line.

Answer (d) ..... [1]

23. A circle, centre O, has a radius of 8 cm.

E and F are points on the circle such that $\angle EOF = 75°$.



(a) Find the perimeter of the minor sector EOF.

Answer (a) ……..…….… cm [2]

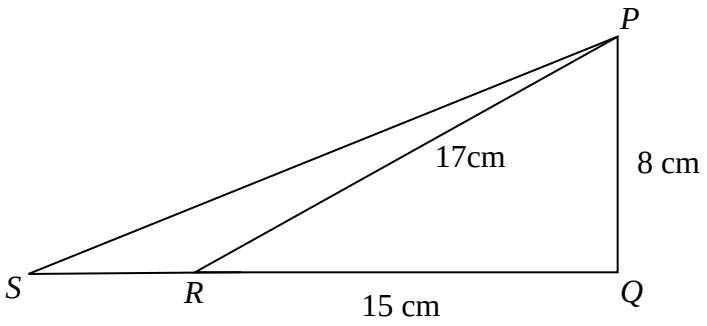
(b) Find the reflex angle EOF.

Answer (b) ……..……° [1]

(c) Find the area of the major sector EOF.

Answer (c) ……..……cm² [2]

24. PQR is a triangle where $\angle PQR = 90°$, PQ = 8 cm and QR = 15 cm.



(a) Show that PQR is a right–angled triangle.

Answer (a)

[2]

(b) Express $\cos \angle PRS$ as a fraction.

Answer (c) ……..……...…… [1]

(c) Find angle PRS.

Answer (b) $\angle PRS$ = ……..…… [1]

(d) The area of triangle PSR is 28 cm^2.

Find the length of SR.

Answer (c) SR = ……...…… [1]

~ End of Paper I ~