

READ THESE INSTRUCTIONS FIRST:

Write your name, class and register number in the spaces at the top of this page. Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.

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

If working is needed for any question it must be shown with the answer. Omission of essential working will result in loss of marks. The total of the marks for this paper is 80.

The use of an approved scientific calculator is expected, where appropriate. 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.



Setter: Ms Janny Yap

This question paper consists of 24 printed pages, including the cover page.

Compound Interest

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

Mensuration

Curved surface area of a cone =
$$\pi rl$$

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

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

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

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

Arc length = $r\theta$, where θ is in radians

Sector area =
$$\frac{1}{2}r^2\theta$$
, where θ 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

$$Mean = \frac{\sum fx}{\sum f}$$

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

1 (a) Calculate the value of
$$\frac{8.13 + 4.71}{6.4 - 2.68}$$
.

(b) Calculate $\sqrt{52.1-2.1^3}$, giving your answer to 2 decimal places.

Answer[1]

2 22 23 24 25 26 27 28

(a) From the above list, write down a number which is a perfect square.

(b) From the above list, write down a prime number.

Hand sanitizer is sold in two sizes, small and large.



Find which of the two sizes give the better value. You must show all your working.

- The first 4 terms of a sequence are 5, 3, 1, -1,...4
 - Find an expression for the *n*th term of this sequence. **(a)**

The p^{th} term in the sequence is -27. Find p. **(b)**

5 In December, Melvin's salary was \$4160. This was a 4% increase of November's salary.

Calculate his salary in November.

\$.....[2] Answer

6 (a) Given that $2^{12} = 16^a$, find *a*.

Answer a =..... [1]

(b) Simplify $\frac{7p^5}{q^3} \div \frac{14}{q^2}$, leaving your answer in positive index notation.

7 Nuru leaves home at 6.30 am and travels to school at an average speed of 24 km/h. She arrives at school at 7.04 am.

How far is Nuru's home to her school?

8 *y* is inversely proportional to *x* and y = 2 when x = 4.

Find the value of *y* when $x = \frac{1}{2}$.

- 9 A map is drawn to a scale of 1: 300 000. The distance on the map between town A and town B is 7 cm.
 - (a) Calculate the actual distance, in kilometres, between town A and town B.

(b) A lake has an area of 18 km².

Find the area of the lake on the map in square centimetres.

Answer cm² [2]

10 (a) Factorise $64a^2 - 49$.

(b) Factorise completely 5my - 10m + ny - 2n.

- 11 A bag contains only 10 red balls, 7 green balls and 8 blue balls. Gaytri takes one ball at random from the bag.
 - (a) Find the probability that the ball is red.

(b) Find the probability that the ball is not green.

(c) Find the probability that the ball is black.

12 A solid cone has a circular bottom of radius 5 cm and a slant height of 12 cm.



(a) Calculate the total surface area, giving your answer in terms of π .

(b) Find the height of the cone.

Answer cm [1]

13 In the hexagon *ABCDEF*, angle *ABC* = 160° and angle *AFE* = 100° .



Calculate *x*.

14 The figure below shows the speed-time graph of a man riding an e-scooter over a time of 50 s.



If the total distance travelled by the e-scooter is 100 m, find

(a) the value of V,

(b) the deceleration of the e-scooter in the last 30 s,

Answerm/s² [2]

(c) the distance travelled in the first 12 s.

15 The diagram shows a sector of a circle with centre *O*, radius 6 cm. and angle 150°. Find the shaded area and give your answer in the form $p\pi + q$.



16 Nora and Eunice conducted a survey to find out the favourite fruits of their classmates. Their results are summarised on the **accurate** pie charts below.



(a) Eunice says that the pie charts show that more people prefer apples in her class.

Explain why she might not be correct.

| Answer | |
|--------|-----|
| | |
| | [1] |

(b) There were 9 people who prefer oranges in Nora's class. How many people are there in Nora's class?

Answer people [2]



(a) Calculate the value of *x*.

(b) Calculate the value of y.

18 (a) List all the solutions to $-6 < 2x \le 8$, where x is an integer.

(b) Solve the inequality $-7x \ge 26$.



Sketches of the graphs of some of these equations are drawn below. Write the correct equation below each sketch.

[4]

.....



.....

20 The heights of a group of 16 students were measured. The results are shown in the stem and leaf diagram.

| 15 | 1 | 2 | 6 | 6 | 8 | 8 | 8 |
|----|---|---|---|---|---|---|---|
| 16 | 2 | 3 | 5 | 5 | 7 | 9 | |
| 17 | 0 | 0 | 1 | | | | |

Key 16 | 2 means 162 cm

(a) Find the percentage of students who are more than 170 cm.

Answer% [1]

(b) Find the median height.

Answer cm [1]

21 (a) $x^2 - 8x + 21$ can be expressed in the form $(x + p)^2 + q$. Find p and q.

Answer $p = \dots$

(b) Hence, or otherwise, solve $x^2 - 8x + 21 = 9$.

Answer $x = \dots$ [2]

- 22 Mr and Mrs Tan each have \$700 to invest for 4 years.
 - (a) Mr Tan invests it at 2.2% per year simple interest. Find the total interest that Mr Tan will earn.

Answer \$ [2]

(b) Mrs Tan invests it at 2.1% per year compound interest. At the end of these 4 years, who will earn more? Justify your answer.

23 (a) Rearrange
$$x = \frac{5-k^2}{2y}$$
 to make k the subject.

(b) Solve these simultaneous equations.

$$4x + y = -1$$
$$3x - 4y = 23$$

Answer $x = \dots$

y = [3]



24 A is the point (2, 1), B is the point (2, 5) and C is the point (7, 10).

(a) *ABCD* is a parallelogram. Find the coordinates of *D*.

Answer (.....) [1]

- (b) Find the equation of the lines
 - (i) *AB*,

(ii) *BC*.

Answer[3]



In the diagram, *CE* is a straight line, AC = 5 cm, AD = 13 cm, angle $CAB = 30^{\circ}$ and angle $ACD = 90^{\circ}$.

(a) Find the angle *ADC*.

Answer° [2]

(b) Write $\cos \angle ADE$ as a fraction.

Answer[1]

(c) The area of triangle ABC is 45 cm². Calculate the value of x.