NAME:		()			
CLASS:	TEACHING GROUP:	MARKS	/100			
The Property of Talente	PEI HWA SECONDARY SC END OF YEAR EXAMINATIO Secondary Three Normal (Ac	HOOL N 2022 ademic)				
MATHEMATIC	.5	28 Sontom	bor 2022			
	28 September 2022					
Candidates answer No Additional Mate	on the question paper. rials are required					
READ THESE INSTRU	CTIONS FIRST					
Write your name, class	and index number on all the work you	u hand in.				
You may use an HB pe	ncil for any diagrams or graphs.					
Do not use staples, pap	per clips, glue or correction fluid.					
Answer all questions.						
If working is needed for Omission of essential w	any question it must be shown with t orking will result in loss of marks.	he answer.				
The use of an approved If the degree of accurac	scientific calculator is expected, whe	ere appropriate. d if the answer is not exa	ict, 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 requires the answer in terms of π .

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.

For Examiner's Use					
Question No.					

This question paper consists of <u>21</u> printed pages, inclusive of this cover page.

Mathematical Formulae

Compound Interest

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

Mensuration

Curved surface area of a cone = πrl

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

Answer all the questions

1 π 3.14 3.14 $-\frac{22}{7}$ -3.142

Write these number in order of size, starting with the largest.

2 (a) Express 792 as the product of its prime factors.

(b) Hence find the smallest integer of
$$p$$
 such that $\frac{792}{p}$ is a perfect square. [1]

Answer $p = \dots$ [1]

- 3 It is given that $x = \sqrt{\frac{y}{z}}$.
 - (a) Find x when y = 125 and z = 3.

Answer $x = \dots$ [1]

(b) Express z in terms of x and y.

Answer $z = \dots$ [2]

4 Sam placed \$25 000 in an account earning a compound interest of 3.6% per year for 5 years.Find the total interest he earned at the end of 5 years.

Answer \$..... [3]

5 (a) $\cos 152^\circ = -\cos z^\circ$. Given that z is an acute angle, find z.

Answer $z = \dots$ [1]

(b) The area of a triangle XYZ is 36.736 cm^2 . XY = 12.8 cm and YZ = 8.2 cm. Find the two possible sizes of angle XYZ.

Answer Angle *XYZ* = or [3]

6 (a) A bag contains some balls, of which 13 are blue, 9 are red and the rest are green. A ball is drawn from random from the bag.

If the probability of drawing the green ball from the bag is $\frac{2}{13}$, show that the total number of balls in the bag is 26.

Answer

[2]

(b) Find the probability that the ball drawn is not red.

- 7 The frequency, f hertz, of a microwave is 123 gigahertz.
 - (a) Write 123 gigahertz in hertz using standard form. (1 gigahertz = 10^9 hertz)

Answerhertz [1]

(b) The wavelength, λ m of the microwave is calculated using the formula $\lambda = \frac{3 \times 10^8}{f}$, where f is the frequency in hertz. Find the wavelength of the microwave in millimeters.

- 8 The line *l* has equation 3y 2x = 9.
 - (a) (i) State the gradient of the line l.

(ii) Write down the coordinates of the point where the line l cuts the y-axis.

Answer (.....) [1]

(b) Determine if the point (2, -1) lies on the line *l*. *Answer*





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The diagram shows three regular polygons, A, B and C joined together. Polygon A is a square and polygon B is a pentagon. Find the number of sides in polygon C.



The distance of her eyes from her feet is 1.65 m.

A flag is placed at the top of the building.

The distance from the top of the flag to the ground is 115 m.

She claims that by tilting her head up at an angle of 40° , she can see the top of the flag.

Explain with working, state whether her claim is correct.

Answer

12 The diagram shows a quadrilateral *ABCD*.



(a) Show that the length of AC is 7 cm. Answer

(**b**) Calculate angle *ACD*.

- 13 Each of the sequence is found by subtracting the same number from the previous term. The first five terms of the sequence are
 - 47 *a b c* 23.
 - (a) Find the values of a, b and c.

(b) Find an expression for the *n*th term of the sequence.

(c) Determine if -123 is a term in this sequence. Answer





AB = 5 cm, BC = 2 cm, QC = (n-2) cm and PQ = (n+4) cm.Find the length of PQ.



- 15 (a) The point C lies on the line AB.
 - (i) Given that 5AC = 2AB, find the ratio of AC : CB.

Answer [1]

Calculate AB.

(b) The scale of a map is $4 \text{ cm} \cdot 1 \text{ km}$.

(i) Write this scale in the form 1 : n.

(ii) A park has an area of 250 cm^2 on the map. Find the actual area of the park in square kilometres.

(ii) AC is 25 cm.

16 (a) The selling price of a mobile phone is \$800.
At the Great Singapore Sale, the mobile phone is sold for \$700 at a discount of x%.
Calculate x.

(b) In a bag, 75% of the marbles are blue. $\frac{2}{5}$ of the remaining marbles are red and the rest are green. If there are 45 green marbles, how many marbles are there in the bag altogether?



In the figure, triangle *ABC* is congruent to triangle *BXZ*. $\angle BAC = 31^\circ, \angle BXZ = 81^\circ, AB = 5.7 \text{ cm}, AC = 6.1 \text{ cm} \text{ and } XZ = 3.2 \text{ cm}.$ Find

(i) $\angle BXZ$, $\angle XBZ$

17 (a)

(ii) the length of XC.

(b) Explain with clear working, prove that XZ is parallel to AB. Answer

18 (a) Write $\frac{3^4}{3^2 \times 3^{-3}}$ as a single power of 3.

(b) Simplify
$$\left(\frac{a^6}{8}\right)^{-\frac{2}{3}}$$
 in positive index form.

(c) Given that $8^{m+1} = 32$, find *m*.

19 (a) Given that $x^2 + 6x - 20 = (x+a)^2 + b$, (i) Find *a* and *b*.

Answer $a = \dots$

 $b = \dots$ [2]

(ii) Hence solve $x^2 + 6x - 20 = 0$, giving your answer to 2 decimal places.

Answer $x = \dots$ [2]

(b) The area of a rectangle is (5ax-10a-3x+6) cm². By factorisating completely, express the dimensions of the rectangle in terms of x and a.

Answer dimensions = cm by cm [3]

20 (a) Simplify 2(2y+1)-3(3y-2).

(b) (i) Write
$$\frac{2}{(x-2)^2} - \frac{3}{x-2}$$
 as a single fraction in its simplest form.

(ii) Hence solve
$$\frac{2}{(x-2)^2} - \frac{3}{x-2} = 1$$
.

Answer $x = \dots$ or \dots [3]

21 This table of values is for $y = x + \frac{8}{x} - 6$ correct to 1 decimal place.

x	0.5	1	2	4	6	8	10	12
У	10.5	3	р	0	q	3	4.8	6.7

(a) Calculate the value of p and q.

Answer $p = \dots$



- (c) Use your graph
 - (i) find the minimum value of y,

Answer
$$y = \dots$$
 [1]

(ii) find the solutions to the equation
$$x + \frac{8}{x} - 6 = 0$$
.

- *Answer* $x = \dots$ [1]
- (d) By drawing a tangent, estimate the gradient of the graph $y = x + \frac{8}{x} 6$ when x = 4.



The diagram shows a box and a chocolate ball in a shape of a sphere. The dimension of the box is $16.8 \text{ cm} \times 5.6 \text{ cm} \times 3 \text{ cm}$. 12 chocolate balls fit equally into the box in 2 rows of 6.

(a) Find the diameter of a chocolate ball.

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(b) Find the volume of empty space in the box.

Question 22 continues next page

Mei Ling buys 10 boxes of chocolate ball at \$12.50 each. She repacks them into a smaller box as shown below and sells them at a charity drive. The dimension of this smaller box is $9 \text{ cm} \times 3 \text{ cm} \times 3 \text{ cm}$. The cost price of each box is 95 cents.



(c) What is the minimum amount, to the nearest dollars, she needs to price each of the box to make at least a profit of 25%. Answer