Name:	Index No.:	Class:

# PRESBYTERIAN HIGH SCHOOL

Compound Interest



#### MATHEMATICS PAPER TWO

4045/02

26 July 2022

# Tuesday

2 hours

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# SECONDARY FOUR NORMAL (ACADEMIC) PRELIMINARY EXAMINATIONS

# DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO. READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in. Write in dark blue or black ink.

Show your working in the space provided below each question.

You may use a pencil for any diagrams or graphs.

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

# Section A

Answer **all** questions.

#### Section B

Answer one question.

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

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 number of marks for this paper is 60.

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  $\pi$ , use either your calculator value or 3.142.

For Examiner's Use						
Category	Accuracy	Symbols	Others	Marks Deducted		
Question						

Total Marks

Setter: Mrs Joyce

Yeo

No.

Vetter: Ms Cynthia Chua

This question paper consists of <u>16</u> printed pages (including this cover page) and <u>0</u> blank page.

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

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

#### Section A (52 marks)

#### Answer all the questions in this section.

1 The stem-and-leaf diagram shows the weight, in kilogram, of 20 students.

 4
 0
 1
 5
 7
 9
 9

 5
 0
 1
 1
 1
 4
 5
 9
 9

 6
 0
 3
 6
 6
 7
 1
 2
 Key: 4 | 0 means 40

Find

(a) the number of students with weight more than 59,

 Answer
 student
 [1]

 (b)
 the median weight.
 s

 Answer
 kg
 [1]

2 The amounts of flour, butter and sugar required to bake a cookie are in the ratio 3 : 2 : 1. The total weight of all three ingredients is 450 grams. Find the amount of each ingredient used.

Answer	flour:	 g	
	butter:	 g	
	sugar:	 g	[3]

3 (a) Calculate

(i) the exact value of  $\frac{9.3 \times 4.62}{5.7 - 2.1}$ ,

Answer [1]

(ii)  $\sqrt[3]{5\frac{1}{7}+2.5^2}$ .

Give your answer correct to 1 decimal place.

Answer [1]

(b) The table shows the number of coronavirus cases of four countries in Europe.

Country	Number of cases (millions)
France	30.51
Germany	27.77
Russia	18.41
Italy	18.18

(Source: *https://www.worldometers.info/coronavirus/*)

Calculate the total number of coronavirus cases of the four countries. Give your answer in standard form.

Answer [2]

4 (a) Expand and simplify (4x+1)(x-3).

Answer [2]

(b) (i) Solve the inequality 3x < 74.

*Answer* [1]

(ii) Write down the largest integer value for *x*.

5 (a) Write 1008 as a product of its prime factors.

*Answer* [2]

(b) What is the largest perfect square that is a factor of 1008?

Answer [1]

(c)  $3780 = 2^2 \times 3^3 \times 5 \times 7$ Write down the lowest common multiple of (LCM) of 1008 and 3780. Give your answer as a product of its prime factors.

Answer [1]

6 The diagram shows a quadrilateral *ABDE*. *ACD* and *BCE* are straight lines and *AB* is parallel to *ED*.



6

- (a) Complete the sentence. The mathematical name of quadrilateral *ABDE* is [1]
- (b) Given that triangle *ABC* is similar to triangle *DEC*, identify all pairs of angles in triangle *ABC* and triangle *DEC* that are equal.

Answer

[2]

- (c) AB = 8 cm, BC = 6.5 cm and DE = 12 cm.
  - (i) Find the scale factor of enlargement of triangle *ABC* to triangle *DEC*.

Answer [1]

(ii) Calculate *EC*.

n [2]

7 (a) Factorise completely 3ax - 6ay + 2x - 4y.

*Answer* [2]

(b) Rearrange this equation  $y = \frac{xb}{b-x}$  to make *b* the subject.

Answer b = [3]

8 This table of values is for  $y = x^3 - 3x^2 - 6x + 8$ .

x	- 3	- 2	- 1	0	1	2	3	4	5
У	р	0	10	8	0	- 8	q	0	28

(a) Calculate the value of p and the value of q.

Answer p =\_\_\_\_\_ [2]

(b) On the grid provided, plot the graph of  $y = x^3 - 3x^2 - 6x + 8$  for  $-3 \le x \le 5$ . Answer on next page [3]

(c) Find the value of x when y = 20.

Answer x = [1]

(d) By drawing a tangent, find the gradient of the curve  $y = x^3 - 3x^2 - 6x + 8$  when x = 4.

*Answer* [2]



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[Turn over

9 *PRS* is a right-angled triangle and *PQR* is a straight line. *PS* = 10 cm, *SR* = 6 cm, angle  $QRS = 90^{\circ}$  and angle  $QSR = 32^{\circ}$ .



(a) Find  $\sin \angle SPR$ . Give your answer as a fraction in its lowest terms.

*Answer* [1]

(b) Calculate the length of *QS*.

Answer \_\_\_\_\_ cm [2] (c) Show that the angle PSQ is 21.1°.

Answer

[2]

(d) Calculate the area of triangle *QPS*.

- $\frac{1}{0}$  Mr Lo owns a car. He usually drives 18 km from home to work for 30 minutes daily.
  - (a) A car wheel is made up of steel rim and rubber tyre. The outer diameter of the car wheel is 66 cm. The diameter of the steel rim is 41 cm.



(i) Find the section height of the tyre.

Answer \_\_\_\_\_ cm [1]

(ii) One revolution of a wheel will make the car move a distance equal to its circumference of the wheel.How many complete revolutions does the car wheel need to make from home to work?

Answer revolutions [2]

(b) On a particular day, he drove a further 6 km in 15 min. Find the average speed, in km/h for the whole of Mr Lo's journey.

Answer km/h [2]

[Turn over

(c) Mr Lo finds ways to save money as the cost of living rises. He compares prices of petrol between different kiosks.

The table shows the prices of the petrol at two different petrol kiosks and the discounts offered.

	PCS	OSSE
Price of petrol (per litre)	\$3.86	\$3.91
Credit card discount	14%	12%
Loyalty card discount	-	5%
Additional rebate	\$3 instant rebate with minimum spend of \$80	-

Mr Lo pumps 49 litres every week. He usually pays for his petrol using credit card to get the discount benefits. He has a loyalty card discount at OSSE.

Which petrol kiosk should he pump petrol at? Show all your calculations.

Answer

#### Section B (8 marks)

Answer one question from this section. Each question carries 8 marks.

11 The table shows the heights of 46 plants, grown under experimental condition A.

Height (cm)	$0 < h \le 10$	$10 < h \le 20$	$20 < h \le 30$	$30 < h \le 40$	$40 < h \le 50$
Frequency	3	10	7	12	14

(a) (i) Calculate an estimated of the mean and standard deviation of the height of the plants grown under experimental condition A.

Answer	mean	cm	

standard	cm	[3]
deviation		

(ii) The heights of 46 plants, grown under experimental condition B were observed. The mean height is 35 cm and standard deviation is 9.8 cm.

In which experimental condition are the heights of the plants more consistent? Give a reason for your answer.

Answer

Experimental condition	because	
-		

[1]

(i) both plants had height of more than 30 cm,

*Answer* [2]

(ii) at least one of the plants had height of more than 10 cm.

Answer [2]





*A*, *B*, *C*, *D* and *E* are points on the circumference of a circle, centre *O*. *AD* is a diameter and *DFOA* is a straight line. Angle  $AEC = 62^{\circ}$ .

Complete these statements by calculating the size of each angle. Give a reason for each statement.

Statement	Reason	
Angle <i>ABC</i> =	 	
Angle <i>FDC</i> =	 	
Angle AOC =	 	
		[3]

12 (b) A plane flew from point P to point Q. R is 300 km on a bearing of  $075^{\circ}$  from Q. PQ = 500 km and angle  $PQR = 142^{\circ}$ .



(i) Calculate the bearing of Q from P.

Answer [2]

(ii) Calculate the distance *PR*.

# **END OF PAPER**