

## TANJONG KATONG SECONDARY SCHOOL **Preliminary Examination 2021** Secondary 4

CANDIDATE NAME	INDEX NUMBER		
MATHEMATICS Paper 1	4048 Wednesday 18 August 2 2 ho		
Candidates answer on the Question Paper.			
READ THESE INSTRUCTIONS FIRST			
Write your name, class and register number on all the work you hand in. Write in dark blue or black pen. You may use a pencil for any diagrams or graphs. Do not use staples, paper clips, highlighters, glue or correction fluid.			

Answer all 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.

You are expected to use a scientific calculator to evaluate explicit numerical expressions.

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, unless the question requires the answer in terms of  $\pi$ ,

At the end of the examination, fasten all your work securely together. 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 80.

### Mathematical Formulae

Compound Interest

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

Mensuration

Curved surface area of a cone =  $\pi r \ell$ 

Curved 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

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

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

1 Circle the irrational number/s from the list below.

1.5π

2.3

 $\sqrt{12.1}$ 

25.82

[1]

2 Simplify  $\sqrt[3]{\left(\frac{a^{15}}{b^6}\right)^2}$ , leaving your answer in positive indices.

Answer	[2]

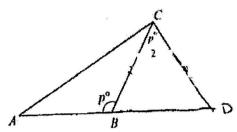
- 3 Given that one solution for the equation  $\frac{1}{2x^2 + kx} = \frac{1}{2}$  is x = -2, find
  - (i) the value of k,

Insuer k = [1]

(ii) a second possible value of x.

insure x = [1]

The diagram shows an isosceles triangle ABC where angle ABC =  $p^{\alpha}$  and BA = BC. Point X is such that angle  $BCX = \frac{p^{\alpha}}{2}$ .

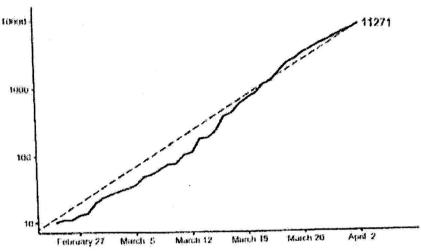


D is the intersection of AB extended and CX extended. John claims that AD will form a diameter of a circle with centre B. Determine whether John's claim is correct or not. Answer

[2]

<sup>5</sup> Given that  $2m-1=(2n+3)^2$ , where n is a positive integer. Show that m is an integer. Answer

The graph below shows the trend in the number of cases of people infected with the coronavirus in a 6 particular country,



Source: Johns Hopkins University (CSSE)

Jamie claims that the trend shown is approximated by a linear equation of the form y = 320x, where x is the number of days and y is the number of infections. Explain why she is wrong.

Answer\_

[1]

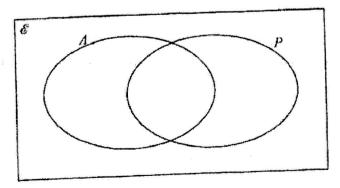
There are 30 members in a community club. 7

All the members take up at least one activity, either aqua aerobics or pickleball. There are 15 members who take up aqua aerobics and 24 who take up pickleball.

Given that  $A = \{members who take up aqua aerobics\}$  and

 $P = \{\text{members who take up pickleball}\}$ 

Indicate in the Venn Diagram below, showing clearly, the number of members in each subset.



[2]

8 The table shows part of a payment plan for Mr Lee who borrowed \$50000 from a bank when he bought a car.

The bank charges an interest of 2.5% per annum, calculated on a monthly basis.

Mr Lee pays \$1000 at the end of each month.

Month 1	3	ount owed at eginning of month	Interest for the month		2	ount paid at d of month	Amount outstanding at end of month	
	\$	50,000.00	\$	104.17	\$	1,000.00	\$	49,104.17
Month 2	\$	49,104.17	\$	102.30	\$	1,000.00	\$	48,206.47
Month 3	\$	48,206.47				N DOCUMENTS	-	
Month 4		Ь						

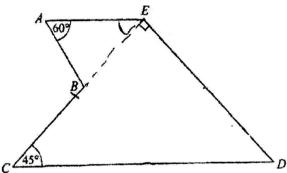
Find a and b.

Answer	-	
ANGWAY	13	.70

b = \$

[2]

In the pentagon ABCDE shown, angle  $BAE = 60^{\circ}$  and angle  $BCD = 45^{\circ}$  AE is parallel to CD, E lies on CB extended and CE = DE.



Find

(i) angle CED,

		122 122
****	anole	ADI
2 2 2 3	STOUTE	ADL

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

Given further that CD = 12 cm, (iii) find the area of triangle CDE.

Answer \_\_\_\_ cm<sup>2</sup> [1]

4048/1/Sec 4 Prefim 2021

[Turn over

A package will leave Australia on 19 August at 21:15, local time in Australia. The time taken for the package to arrive at Singapore is 6 hours 30 minutes. Australia time is 2 hours ahead that of Singapore time. What is the date and time at which the package arrives in Singapore?

swer \_\_\_\_\_\_[3]

11 The picture shows a model terracotta warrior.



The model has height of 15 cm and weighs 20 grammes.

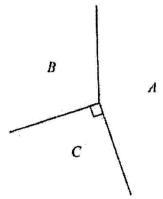
A similar terracotta warrior has a height of 1.8 metres. Find the weight of the larger terracotta warrior.

Give your answer in kilogramme, correct to 1 decimal place.

Answer ... kg [3]

	12	(a)	The price, P, of an object varies directly.  The price is \$3 when the height is 20 cm.	y as the square o	) its heigh	i. ħ.		
			Find the price when the height is 30 cm	•				
					Answer	\$	医骨膜膜炎 医原皮 医外骨炎 医环状体	[2]
		b)	Given that $R$ varies inversely as the squadoubled.	are of T, find the	e percentag	e change in /	when T is	
F								
							24	r=3
-					Answer_		%	[3]
13	Fa (2)	ctor	ise completely the expressions. $4(x-y)^2 - 9(x+y)^2$					
	, <b>.</b>							
				Answer		************		[2]
	(b)	1	0ax + 15ay - 8bx - 12by	d \$ 7 mad of 7 m/2 area area.	*******	************		
						•		
				Answer			and the second seco	[2]
***************************************				# A T T T T T T T T T T T T T T T T T T	· · · · · · · · · · · · · · · · · · ·		Turn	

The diagram shows part of three regular polygons A, B and C fit together at a common vertex. Polygon A is an icosagon, a 20-sided polygon. 14

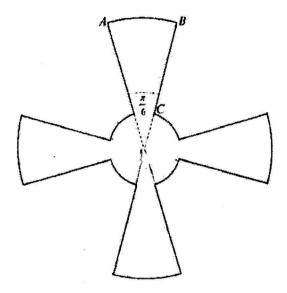


What is the special name for polygon B?

newer	1	[4]
	THE RESERVE OF THE PARTY OF THE	

15	Given that $x_1, x_2, x_3, \dots, x_{16}$ are 10 unique numbers whose mean, $\tilde{x}_1$ is 11.8 and standard deviation is 4.729. Find the value of (i) $x_1 + x_2 + x_3 + \dots + x_{16}$	
	Answer	proves decan
	Answer	[2]
(	Each of the value of $x_n$ is changed as follows:  If $x_n < \bar{x}$ , then $x_n$ is decreased by 2.  If $x_n > \tilde{x}$ , then $x_n$ is increased by 2.  (iii) Explain clearly, how this would affect the value of the standard deviation.  Answer	1-3
		[2]

The diagram shows four identical blades of a fan, whose centre is O. Arc AB on the fan blade forms an angle of  $\frac{\pi}{6}$  at the centre O. OC is 5 cm and BC is 25 cm.



(i) Find arc length AB.

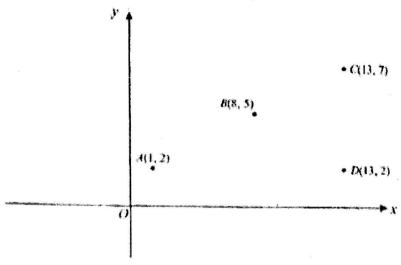
6.5		
Answer	cm	[]

(ii) Find the perimeter of the shape.

		cm	[3]
Insurr	· · · · · · · · · · · · · · · · · · ·		* *
*	***************************************		

ľ	<b>(i)</b>	Ex	press:	x² + 6:	r + 10	in the	form	1 (x +	1: p) <sup>2</sup>	3 + q	, whe	те р	and q s	re con	stants to be fo	ound.	
												A	Inswei			the lighter than the second	[1]
	(D)	G	iven t	hat y =	x2+6	$6x + c_i$	mak	e x th	ie si	ubje	ct of	the fo	rmula.	•			
														•			
			303														
													Answe	r	*****		[3]
18	7	The :	stem-a	ind-lea	of diag	ram s	hows	the d	aily	y nur	nber	of cu	stomer	s over a	a period of on	e month a	l Branch
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					2	3	3	3		4	8	9	7 9	9	2 ×		
					4	1 2	1 3	2	1	5 t	6	7					
				Key:		-   4   1	_	mean	ns 4	H cu	stom	ers			e es		
	į	(i)	Write	e dowr	n the n	nediar	of	umbe	ro	<b>f</b> cus	tome	rs for	Branc	hΑ.			
													Ansv	ver	# 45 jk # 44 j	com an car sur dans de tro de de ser ma se la co	[1]
		(ii)	Find	the in	terqua	rtile r	ange	for B	ran	ch A	٠.						
													4				m
		(III	And	ther h	ranch	Branc	h B	had a	m	ediar	n of 2	7 cus	6. "		n interquartile		
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		An	swer		ting the grown property arrange			*****	****		· · · · · · · · · · · · · · · · · · ·		~~****	******	**************************************	*****	*****
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19 In the diagram, A(1, 2), B(8, 5), C(13, 7) and D(13, 2) are four points.



(f) Show that AB + BC = 13.0, correct to 3 significant figures.

Answer

(ii) By finding AC, determine the sum of interior angles in figure ABCD, justifying your answer.

Answer [3]

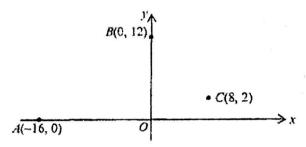
121

20	(1)	Express	9801	as a	product of	'ils	prime	factors
----	-----	---------	------	------	------------	------	-------	---------

	Answer	[1]	
(11)	Hence, explain why 9801 is a square number.		
insu	24°	[1]	
136	a and b are both prime numbers.  Find the smallest value of a and b such that $9801 \times \frac{a}{b}$ is a perfect cube.		

Answer	a	20		b	m	[2]
*********			***	100		

21 The diagram shows three points A(-16, 0), B(0, 12) and C(8, 2).



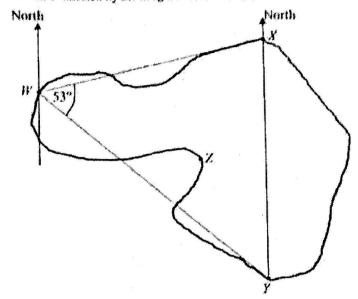
(i) Find the equation of line AB, expressing your answer in the form ax + by + c = 0, where a, b and c are constants to be found.

A circle is drawn with centre C such that AB is a tangent to the circle. The perpendicular distance of a point (p, q) from a line ax + by + c = 0 is given by the formula

Distance = 
$$\frac{ap + bq + c}{\sqrt{a^2 + b^2}}$$

(II) Using the formula above, determine the radius of the circle.

22 The diagram shows the positions of four checkpoints W, X, Y and Z in a jungle reserve area. The checkpoints are connected by the irregular tracks shown.



X is due north of Y and is on a hearing of  $077^{\circ}$  from W. Angle  $XWY = 53^{\circ}$  and WY is 60 metres.

(I) Calculate the distance XY.

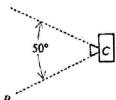
Auswer		m	[2]
7828.1318.1	**********		

(II) Given that the bearing of Y from Z is  $152^{\circ}$ , write down the bearing of Z from Y.

Answer [1]

(III) A hidden camera, C, is to be fixed at checkpoint Y to capture animals that move from H to Y via Z, along the irregular track. The camera has a view angle of 50° and can capture anything within this angle.

as shown in the diagram below.

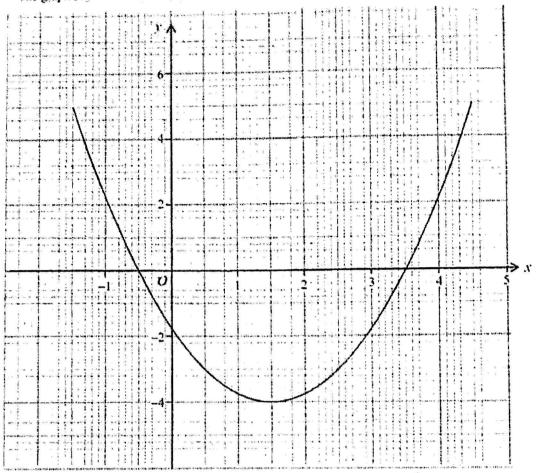


By measurement, determine the minimum bearing where the line CP must be pointed when the camera is fixed at point Y.

Answer	[]	]
Answer	ſ,	

(i)	Find the coordinates	oordinates $(1, 1)$ , $(5, 11)$ as of point $M$ .	(9, 1) respectively.	
(ii)	State the gradient o	f line segment PM.	Answer	[1]
		**		
			Answer	
(ii	i) "The line segment.	PM bisects angle QPR." the statement above is con		

24 The graph of  $y = x^2 - 3x - 1.75$  is shown on the grids below.



(a) Write down the equation of the line of symmetry.

Answer		1	11
May 11 (4	L. C. C. C. D. C.	- 1	, 1

(b) Draw the line representing 4y = 7x - 16 for  $-1 \le x \le 5$  on the grids.

[2]

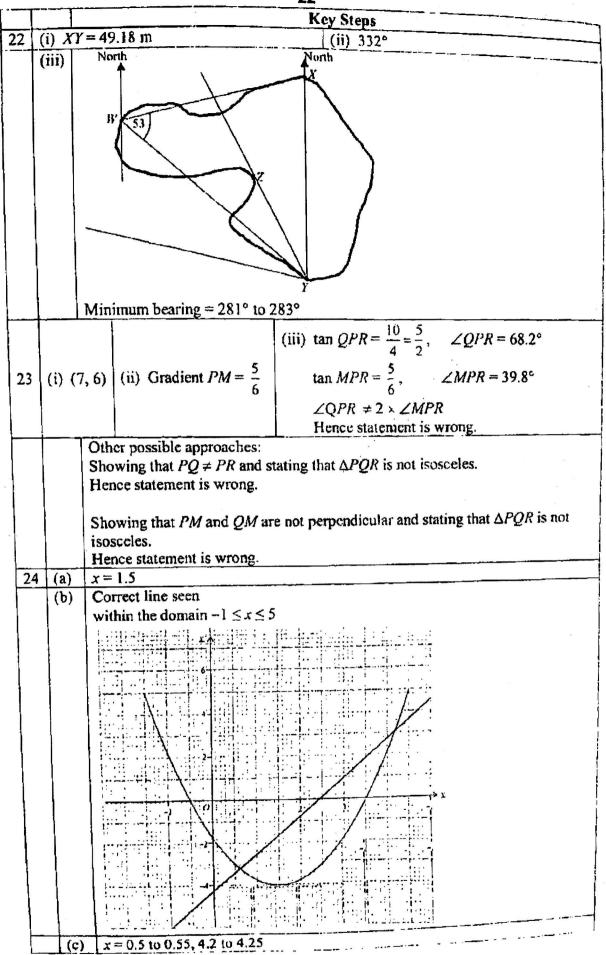
(c) Using the graphs and showing your working clearly, find the solutions of the equation  $4x^2 - 19x + 9 = 0$ .

Answer

[3]

## Answers:

	Ko	y Steps	
1		Γ .	
1	1.5 $\pi$ $\sqrt{12.1}$ 2. $a^{10}$		(ii) $x = \frac{1}{2}$
4	$\angle ACB = \frac{180 \cdot p}{2} - 90^{\circ} - \frac{p}{2}$	5. $(2n + 3)^{\frac{5}{2}}$ - (ever	
	2 2	- (odd) - odd	<b>,</b>
	$\therefore \angle ACD = 90^{\circ} - \frac{P}{2} + \frac{P}{2} = 90^{\circ}$	$\therefore 2m \text{ odd} + 1$	
	John is correct (angle in semicircle)	= cvcn	
		m = even : 2	integer
7	The scale on vertical axis is not unifor	nn, hence the graph ca	nnot be linear
'	8	7	
	· ·		
	6 (9) 15		
-			
8	$a = $100.43, b = $47306.90$   (i) $\angle CED = 90^{\circ}$   (ii) $\angle ABC = 105^{\circ}$   (iii)	ii) Area of $\triangle CDE = 3$	66 cm <sup>2</sup>
10			ntage change =
		6.75   -75%	
13		+3y) 14. Pent would differ more from	
15		standard deviation wil	
16	(i) arc $AB = 5\pi$ or 15.71 (ii) Perim	eter = 283.76 cm	
17			
1	(ii) $y = x^2 + 6x + c$ $x^2 + 6x - y - c$		
	$x^2 + 6x + 3^2 = y - c + 3^2$		
	$(x+3)^2 = y - c + 9$		
	$x+3 = \pm \sqrt{y-c+9}$		
_	$x = \pm \sqrt{y - c + 9} = 3$		ma weenth more
13	8 (i) 33.5 (ii) 20 (iii) Expand Branch A be customers	ecause Branch A has co	Misicinia insec
1	9 (ii)   360	jur to	
2			
	(ii) All powers are even		
2	$\frac{1}{1}$ (i) $\frac{3}{1}$ (i) $\frac{4}{1}$ + 48 0		
	(ii) radius $\frac{3 \cdot 8 \cdot (-1)2 \cdot 48}{\sqrt{3} \cdot (-4)}$ 12.8		
	√3* + (−4)		
	1		
1.	1.1.		•





# TANJONG KATONG SECONDARY SCHOOL Preliminary Examination 2021 Secondary 4

CANDIDATE NAME					· · · · · · · · · · · · · · · · · · ·
CLASS			INDE	X NUMBER	
MATHEMA'	TICS			4	048/02
Paper 2				Monday 23 A	ug 2021
			,;	2 hours and 30	minutes
READ THESE IN	NSTRUCTIONS FIRST				:
Write in dark blu You may use a p	e, class and register numb le or black pen. pencil for any diagrams or les, paper clips, highlighte	graphs.			
Omission of ess You are expecte If the degree of	stions.  eded for any question it moterated working will result it and to use a scientific calculation accuracy is not specified significant figures. Give a ryour calculator value or	n loss of marks. plator to evaluate e in the question, ar poswers in degree:	explicit numerical ex and if the answer is n to one decimal pla	ot exact, give ini	
The number of r	e examination, fasten all y marks is given in brackets marks for this paper is 10	at the end of	together. each question or pa	art question.	

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Area of triangle 
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Are length =  $r\theta$ , where  $\theta$  is in radians

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, 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

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

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

### Answer all questions,

1 (a) Write as a single fraction in its simplest form.

(i) 
$$\frac{3r^2}{w} + \frac{9r^2}{w^3}$$

Answer	*** * * * * * * * * * * * * * * * * * *	~ ~	¥	Q.,	84	[1]

(ii) 
$$\frac{3}{y-1} - \frac{5}{y+6}$$

**(b)** Simplify 
$$\frac{2v^2 - 5v - 12}{16 - v^2}$$

In stall A, one Chicken pie costs \$1.50, one Mushroom pie costs \$1.30 and one Tuna pie costs \$1.80. In stall B, one Chicken pie costs \$0.20 more, one Mushroom pie costs \$0.30 less and one Tuna pie costs \$0.10 less.

The information can be represented by the matrix  $P = \begin{pmatrix} C & M & T \\ 1.5 & 1.3 & 1.8 \\ 0.2 & -0.3 & -0.1 \end{pmatrix}$  Stall B

(a) Simon buys 50 Chicken pies and 20 Tuna pies.
 Ivy buys 40 Chicken pies, 20 Mushroom pies and 30 Tuna pies.
 Represent their purchases in a 3 × 2 Matrix Q.

Answer Q = [1]

(b) Evaluate the matrix R = PQ.

Answer R = [2]

(c) Use your answer in (b) to explain whether it is better for Simon to buy from stall A or stall B.

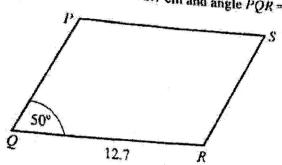
Answer

(d) Stall B has a promotion of 30% off on all pies while prices of pies in stall A has increased by 10%.

Using your answer in (b) or otherwise, calculate the lowest total amount both Simon and Ivy will pay for the pies.

Answer \$ ......[3]

(a) In the parallelogram PQRS, QR = 12.7 cm and angle  $PQR = 50^{\circ}$ .



The area of the parallelogram is 52.6 cm<sup>2</sup>.

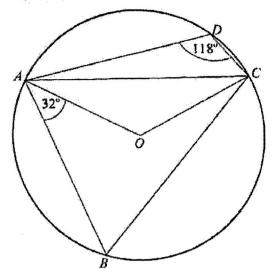
(i) Show that the length of RS = 5.407 cm.

Answer

(ii) Hence or otherwise, calculate the length of the longer diagonal of the parallelogram PQRS.

[2]

(b) In the diagram, the points A, B, C and D lie on a circle, centre O.  $\angle ADC = 118^{\circ}$  and  $\angle BAO = 32^{\circ}$ .

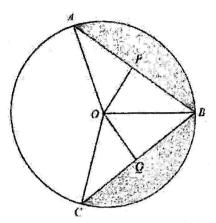


Find, giving reasons for each answer, (i) angle ABC,

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Answer	*	è	*	*	*	6	*	٠	*		,	•	*	•	ŧ	*	*	٠	8	*	8	Ļ		3	

(ii) angle BCO.

inswer	* × *	e i	8 >	 ••	•	٠.	•	*	• •	,	 v	•	*	•	[2]



A, B and C are points on the circle centre O and AB = BC.

P is the midpoint of chord AB and Q is the midpoint of chord BC.

(a) Prove that triangle OAP is congruent to triangle OCQ. Give a reason for each statement you make.

Answer	
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. 19 contra en la contra de la contra dela contra de la contra dela contra de la contra del la contra de la contra de la contra del la cont	
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(b) Given that the radius of the circle is 6 cm and the obtuse angle  $AOC = \frac{7\pi}{9}$ , calculate the shaded area.

Answer ..... cm² [4]

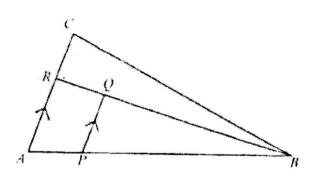
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5	(a)	A cuboid has a volume of 250 cm <sup>3</sup> , correct to the nearest cubic centimetre.
	2	The height of the cuboid is 8.4 cm, correct to 1 decimal place.

Calculate the greatest possible base area of the cuboid.

							0 101 0
nurr		4.	,	5.5.7	8	cm <sup>2</sup>	[2]

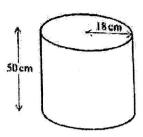
(b) In the figure, AC and PQ are parallel lines. P has on AB such that AP, PB = 1:5 and R lies on AC such that AR:RC = 3:2



(i)	Explain why triangles ABR and PBQ are similar.
	Answer
	· · · · · · · · · · · · · · · · · · ·
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(ii)	Show that the ratio of area of trion 25:11.	Sp. 940		
	25: 11. States of trian	ele PHQ to the	area of trapezium APQ	R is
	Answer		2	
				[1]
(iii)	If the area of the trapezium APQR	ic 22 nm²		
	2,	is 22 cm , care	ulate the area of triang	ic arc.
g <sup>2</sup>				
				7 100
		Ans	wer	cm <sup>-</sup> [3]
	er e			
	e e e			

6 (a) The diagram shows a cylindrical container used to dispense coffee in a hotel.

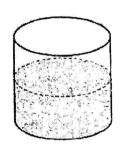


The container has a height of 50 cm and a radius of 18 cm.

(i) Calculate the volume of the cylinder.

Answer	 cm <sup>3</sup>	[1]
MISIVE	 CIT-	L

(11) 25 litres of coffee are poured into the empty container. Work out the height, h, of the empty space in the container.



(iii) Cups in the shape of a hemisphere of radius 3.5 cm are filled with coffee from the container.



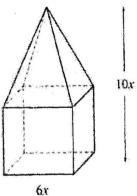
Work out the maximum number of these cups that can be completely filled from the 25 litres of coffee in the container.

A	r	21
Answer		4

(b) A solid shape consists of a cube with a pyramid on top has a total height of 10x cm. The pyramid sits perfectly on one surface of the cube.

4048/2/Sec4Prelim21

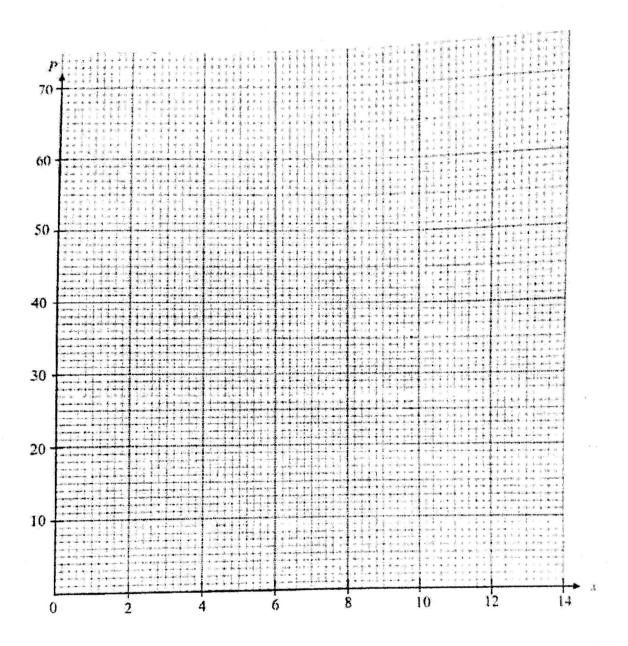
Each side of the cube is 6x cm. Find an expression, in terms of x, for the surface area of the solid. Give your answer in its simplest form.



Answer	+4330+1 \$550 A A A A A A A A A A A A A A A A A A	$cm^2$	[4]
	ITura		•

to cuts	enclosure will be a rectangle with an aren of 60 m <sup>2</sup> .
	60 m <sup>2</sup>
(4)	The enclosure is x in long.
(8)	Show that the perimeter of fencing, P m, required for the enclosure is given by
	$P=2x+\frac{120}{x}$
	i.
	The table below shows some values of $x$ and the corresponding values of $P$ for the fencing.
	x 2 4 6 8 10 12 14
	P k 38 32 31 32 34 36.6
(b)	Find the value of k.
	• • • • • • • • • • • • • • • • • • • •
	Answer k=
ė.s.	On the said plants and the said plants are 120 c.
(c)	On the grid, plot the points given and draw the graph of $P = 2x + \frac{120}{x}$ for $2 \le x \le 14$ .
(d)	Mabel only has 35 m of fencing.
	Use your graph to find the range of values of x that she can choose.
	Answer
(e)	Mabel would like to use the graph to estimate the length and width of the enclosure when it
4	is a square. Suggest an equation of the straight line that Mabel should draw.

Auswer



[3]

8 The table below shows part of Ahmad's personal income tax bill.

		S'PORE (\$)	OTHER COUNTRIES (S)	TOTAL (S)			
EMPLOY	MENT	123, 419.00		123, 419.00			
EMPLOYMENT FOTAL INCOME LESS: Approved Donation ASSESSABLE INCOME LESS: PERSONAL RE Earned Income NS-man/wife/par		123, 419.00		123, 419.00			
LESS: A	pproved Donati	ons		1, 543.00			
ASSESS.	ABLE INCOME			р			
LESS:	PERSONAL	RELIEFS					
	Earned Incom	e	1,000.00				
	NS-man/wife/	parent	1,500.00				
	Life Insurance		19, 318.00				
TOTAL	PERSONAL R	ELIEFS		9			
CHARC	GEABLE INCOM	ME		100, 058.00			

(a) Calculate the values of p and q.

Answer	P	=	*			è	•	*		*	*	*	•	*	٠			+	*	4	*	٠			•	·		
	4	7 =	î	•	•	+	*	•	×	*	•	×	٠	•	*	*		 .,*	٠.	: 44			× :	*	*	***************************************	2	

(b) The tax rate for the year is given in the table below.

	Chargeable Income (\$)	Rate (%)	Gross Tax Payable (\$)
On the first	20,000	0	0
On the next	10,000	2.0	200
On the first	30,000		200
On the next	10,000	3.5	350
On the first	40,000		550
On the next	40,000	7.0	2,800
On the first	80,000		3,350
On the next	40,000	11,5	4,600
On the first	120,000		7,950
On the next	40,000	15	6,000

https://www.iras.gov.sg/irashome/Individuals/Locals/Working-Out-Your-Taxes/Income-Tax-Rates/

(i) Show that Ahmad's income tax payable is \$5656.67.

Answer

[2]

(ii) In the same year of tax assessment, Angie's income tax payable is 0.55 of Ahmad's. Angie claims that her chargeable income is also 0.55 of Ahmad's chargeable income. Do you agree? Support your stand with calculations.

.....[5]

9 Small triangles are formed by placing rods between dots as shown in the diagrams.



312 314

Diagram 1

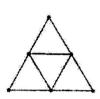


Diagram 2

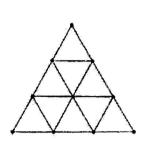


Diagram 3

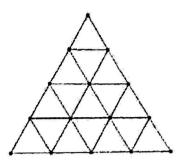


Diagram 4

(a) Complete the table below.

Diagram a	1	2	3	4	5
Number of small triangles (T)	1	4	9	16	
Number of dots (D)	3	6	10	15	
Number of rods (R)	3	9	18	30	45

15.		[2]
(b)	Explain why it is not possible to have 1025 small triangles.	
	, , , , , , , , , , , , , , , , , , ,	[1]
	NAMES AND	

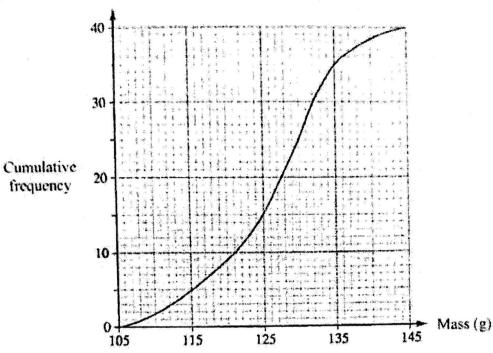
(c) Given that R = D + T - 1, find the value of n when D = 561 and R = 1584.

																				7	ŧ	
Answer	n	****			 		. *	•		•	*		*	,	*	,	×	*	L	<b>.</b>	j	

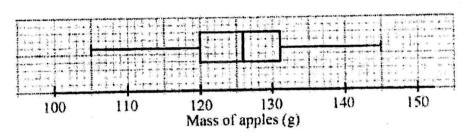
(d)	A sequence is 1, 3, 6, 10, 13		
	(i) The <i>n</i> th term of the above sequence is $\frac{1}{2}n$	(n+1).	
	Write an expression for $R$ in terms of $n$ .		
	(ii) How many rode are there in Discount 160	Answer	[1]
	(ii) How many rods are there in Diagram 16?		
		Answer	[1]
(e)	Find an expression for $D$ in terms of $n$ .		
			* *
		Answer	[1]
······································			Turn over

10 The masses of 40 oranges were measured.

The cumulative frequency curve below shows the distribution of the masses.



The box-and-whisker below shows the distribution of the masses of 40 apples.



(a) Use the two diagrams to complete this table for the two types of fruits.

Туре	Lower quartile	Median	Upper quartile	Inter-quartile range
Orange	8	g	Š.	HIE
Apple -	<b>E</b>	126 g	2	118

b)	Describe how the cumulative frequency curve for the apples may differ from the curve for the oranges.					
	AND RESTRICTED A SINGLE SERVICE OF LIGHTED TO SERVICE OF THE SERVICE S	grande estible				
	AND THE DESCRIPTION VIEW CONTROL OF COORDINATE OF COORDINA					

(e)	a minor							
	For each statement, write True or False. Give a reason for each answer, stating clearly which statistics you use to make your decision.							
	(i) The apples are heavier than the oranges.							
	(ii) A greater percentage of oranges weigh more than 131g than apples.							
	*******	because	**********	*********	********			
	*******	******	***********	** *** *** *** *** *** *** *		[1]		
(d)	The groupe	d frequency table	for the masses of	the oranges is give	n below.			
	Mass (mg)	105 ≤ m < 115	115 ≤ m < 125	125 ≤ m < 135	135≤m<145			
I	requency	5	10	20	5			
	(iii) 2 orang	ate an estimate of	random without r	Answer	eigh at least 125 g.			
				Answer	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	[2]		

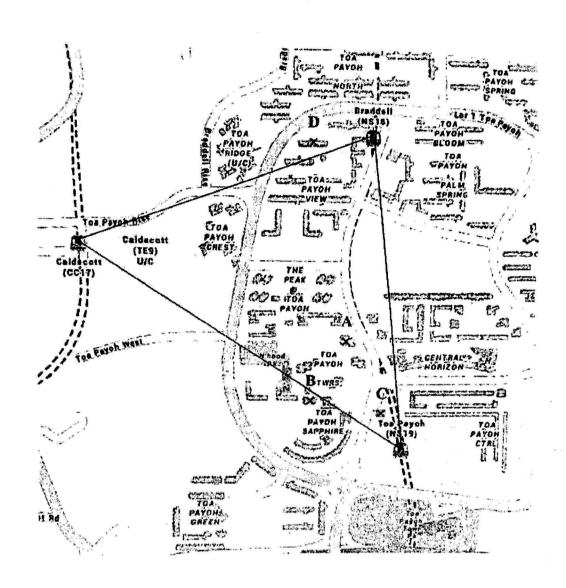
11 (a)

On	Monday, Dev goes on a 3.6 km run.					
(i)	His average speed for the first 1.2 km is x km/h.					
	Simplify and write down an expression, in terms of $x$ , for the time taken for the first 1.2 km.					
	Answer minutes [1]					
(ii)	His average speed for the last 2.4 km of the run is 2 km/h slower than the first 1.2 km.					
	Simplify and write down an expression, in terms of $x$ , for the time taken for the final 2.4 km.					
	Answer minutes [1					
air	Day talean 75 minutes to assumbly the C.H.2 C.H.					
(m)	Dev takes 25 minutes to complete the full 3.6 km run. Form an equation in x and show that it simplifies to $25x^2 - 266x + 144 = 0$ .					

(iv) Solve the equation  $25x^2 - 266x + 144 = 0$ , leaving your answers correct to 3 decimal places.

	*
	Answer $x = \dots$
(b)	On Friday, Dev completed a 4 km run on the same average speed that he ran for the last 2.4 km of the 3.6 km run on Monday.
	Calculate the time Dev took to run 4 km on Friday.  Give your answer in minutes and seconds, correct to the nearest seconds.
	*
	Answer ,

On the map, 3 MRT stations, Braddell (NS18), Caldecott (CC17) and Toa Payoh (NS19) 12 (a)



On the map,

(i) construct the perpendicular bisector of the line connecting NS18 and NS19.

(ii) construct the angle bisector at NS18. [1]

[1]

(iii) shade the region inside the triangle that is closer to the line joining NS18 and CC17 and is closer to NS18 than NS19. [1] 4. w

John and Chich, both Singaporeans, are looking at buying a re-sale unit in Toa Payoh.

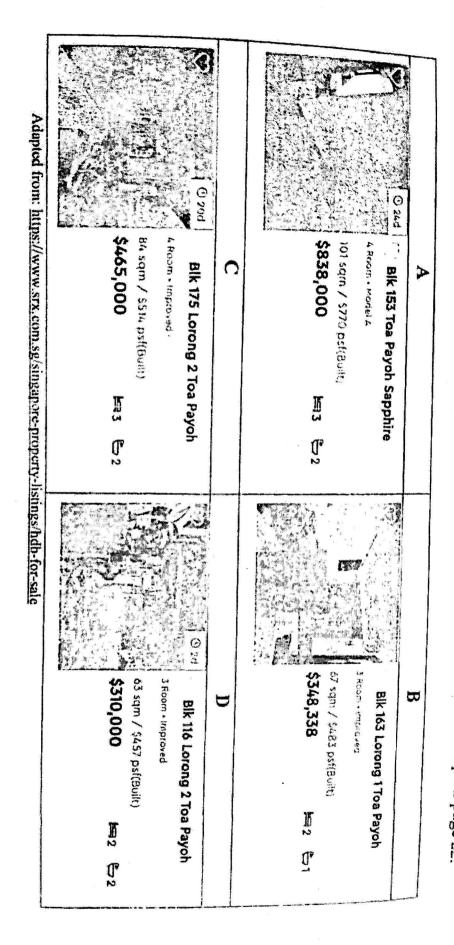
They found the following units below and marked them A, B, C and D on the map on page 22.

A	B
Blik 153 Toe Payoh Sepphire \$838,000 kg 1 6-1	8lk 163 Lorong 1 Toa Payoh  \$348,338 №2 ₹=1
C	D
Blk 175 Loreng 2 Toa Payoh  \$465,000 ks 1	Bik 116 Lorong 2 Toa Payoh  \$310,000 ba? Co

Note: sqm + square metre (m<sup>2</sup>) psf \* per square foot (psf)

(b)	Which unit is the most value for money? Explain.		
			ē
	**************************************		
		* * * * * * *	[1

They found the following units below and marked them A, B, C and D on the map on page 22. John and Chieh, both Singaporeans, are looking at buying a re-sale unit in Toa Payoh.



Note:  $sqm = square metre (m^2)$ psf = per square foot (psf)

(b) Which unit is the most value for money? Explain.

(c) Both John and Chich are first-time HDB applicants as a married couple, they want to purchase a unit that is closest to the MRT station. Their combined monthly income is \$7 500 and they wish to complete financing their home in 15 years' time using the HDB loan.

John's friend, Janet, also Singaporean, is looking at purchasing unit B, which is 2 km away from her mum's place, under the Single's scheme. Janet is 38 this year and her monthly salary is \$6 500.

Assuming that they receive all the relevant grants and take up the maximum loan amount, suggest the number of years Janet should take to service the bank loan such that her interest paid is lower than John's and Chieh's.

Justify any decisions you make and show your calculations clearly.

Table 1: Comparison between HDB and Bank Loan

	HDB Loan	Bank Loan
Maximum loan	90% of purchase price	75% of purchase price
Interest Rate (p.a)	2.6%	1.8%

Table 2: Grants that can be used to offset the purchase price of the flat

		The state of the s	) [Only for Sing	Charles with same and same district	
Who Is Eli	thie?	Incor	ne Celling	Gra	st/imount
Singles		~	\$4,500	Ŏ	\$40,000
MAN	Couples/ families	~	\$9,000	ā	\$80,000
oximity Hous	ing Grant (PH	G) [sta	y within 4km fro	m parent	·*)
Who is Etig	ible? ;- []	Incor	ne Ceiling	Grai	it Amount
Singles				X	\$10,000-
T Slikies			income eiling!		\$20,000*
MIN	Couples/ families			do	\$15,000 — \$30,000*
igles Grant Who is Ella	ible?	ricon	ne Celling	Gran	tAmount
Singles (3: old and at		\ un	7,000 (purchase der Single Singapore izen Scheme)	ð	2 to 4-room \$50,000
	,	N un	4,000 (purchase der Non-Citizen mily Scheme)	à	Min 5-room \$40,000
					and the same of th
mily Grant	The property of the second	19 4 1 1 1		Crant	Amount
mily Grant Who is Eligi	ble?	ncom	e Celling 🔠		
man man or the same of the same of	Couples/ families	ncom	e Celling \$14,000	A Company	2 to 4-room \$50,000

Adapted from: https://www.homerenoguni.sg/articles/tips-advice/hdb-resale-grant/

End of Paper

2021 Secondary 4 Mathema	tics Prelim Paper 2 M	arking Scheme		
$I(a)(i) \frac{w^2}{3}$ (ii) $\frac{-2}{(y-1)}$	$\frac{y+23}{1)(y+6)}$ (iii)	$\frac{2\nu+3}{\nu+4}$		
2(a) $\begin{pmatrix} 50 & 40 \\ 0 & 20 \\ 20 & 30 \end{pmatrix}$ (b) (c) Stall A because he		stall B		
3(a)(ii) 16.7 (b)(i) 62 4(a) $OP = OQ$ (equal chord $\angle OPA = \angle OQC = AO = OC$ (radii of contrast)	600 Mahanganganganga	sees of chord)		
Triangle $OAP \equiv \text{triangle } O$		,		
ZA ZR	AB= <b>LONB</b> (correspo RB= <b>LPQB</b> (correspo CA common angle ngles ABR and PBQ a	nding <b>Z</b> )	(ii) 25: 11	(iii) 120
6(a)(i) 50 900 (ii) 25.4		$240x^{2}$		
$p = 2x + \left(\frac{60}{x}\right) \times 2$ $= 2x + \frac{120}{x}$		4.7≤x≤12.		p = 4x
8(a) $p = 121876.00, 9$	y = 21818.00			
(b)(ii) $\frac{76588.12}{100058} \times 100\%$ Disagree as Angie's is 0.4 or $100058 \times 55\% = $55031$ Disagree as Angie's incompanies in	.90 me is less than \$55 03	1,90.		

