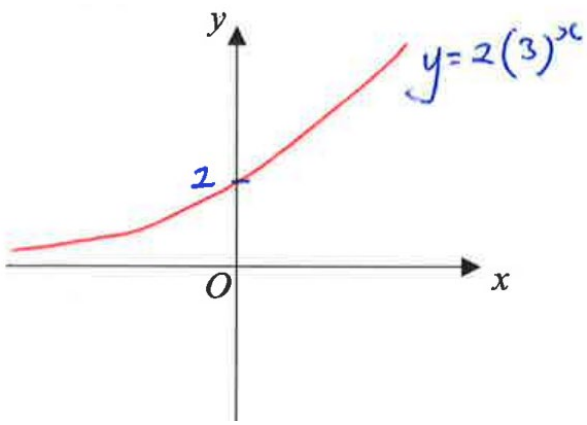
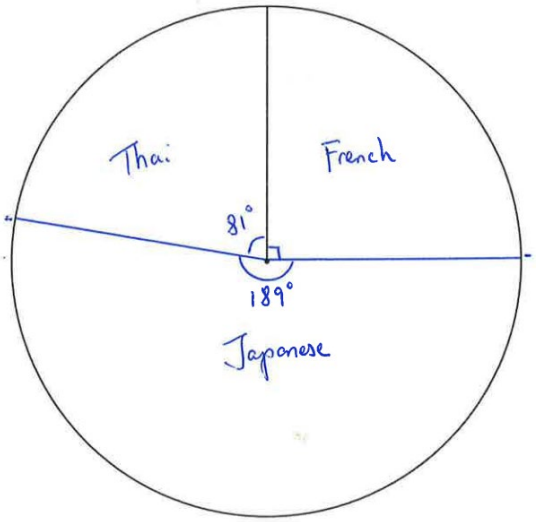
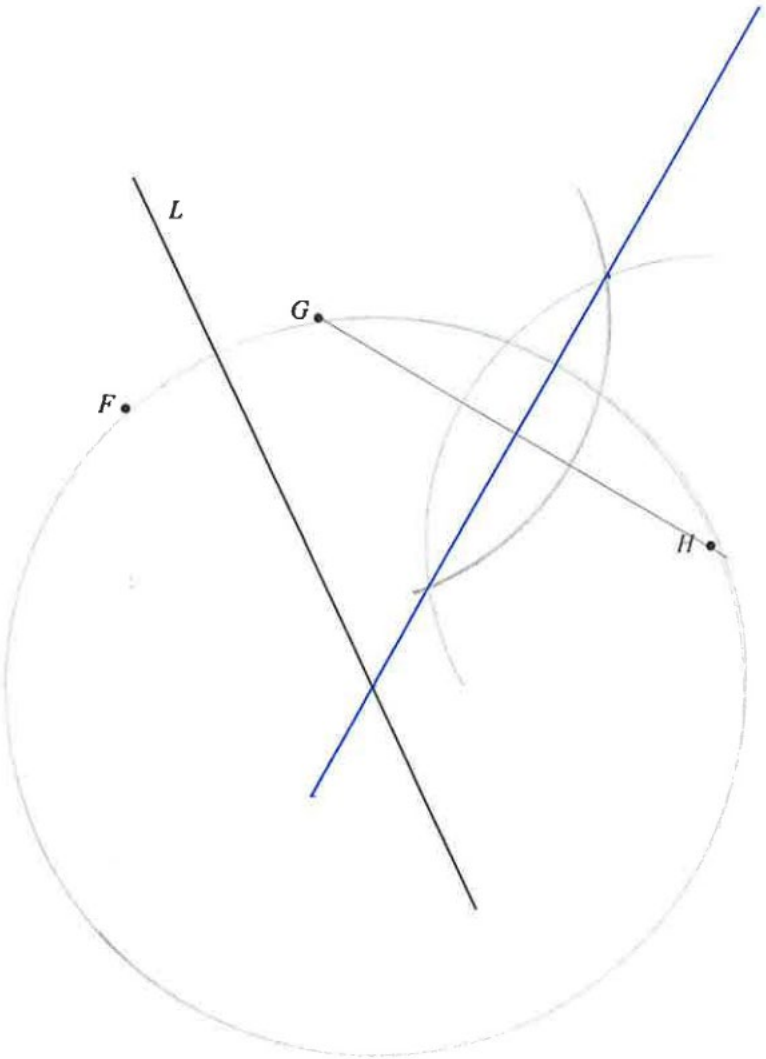
Tampines Secondary School

Sec 4E/5NA/4NA OOS Math Prelim Exam Paper 1 2024 Marking Scheme

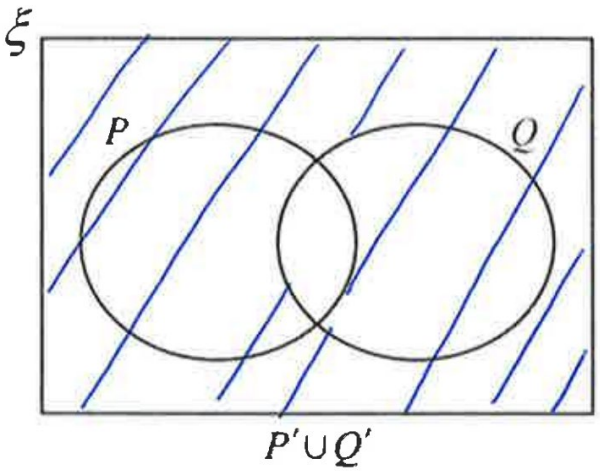
Total Marks: 90

√ = follow through

No.	Answers	Marks
1	$3x-8<56$ $3x<64$ $x<21.3$ The largest prime number is 19	M1 A1
2	$-2a+15b$	B1
3	$4(x^3-5y)(x^3+5y)$	B1 for $4(x^3-5y)(x^3+5y)$ or $(2x^3-10y)(2x^3+10y)$ seen
4(a)		B1
(b)	$p=-3$	B1
5	Total number of rhinos $=27000\left(1+\frac{3}{100}\right)^4$ $=30388.73\approx 30000$	M1 A1

No.	Answers	Marks
6		90° for French --- B1 Thai and Japanese with correct angles measured --- B1
7		B1 --- perpendicular line of *GH* drawn. B1--- for the circle drawn passing through *F, G* and *H* and has the centre at the intersection of the two lines

No.	Answers	Marks
8(a)	$2420 = 2^2 \times 5 \times 11^2$ **Not all the powers of the prime factors are multiples of 3**, hence 2420 is not a perfect cube.	B1 B1
(b)	LCM $= 2420 = 2^2 \times 5 \times 11^2$ HCF $= 110 = 2 \times 5 \times 11$ The two numbers are $2^2 \times 5 \times 11 = 220$ and $2 \times 5 \times 11^2 = 1210$	 B1 , B1
9(a)	$\left(\frac{27x^{15}}{8y^{12}}\right)^{-\frac{1}{3}} = \left(\frac{8y^{12}}{27x^{15}}\right)^{\frac{1}{3}}$ $= \frac{2y^4}{3x^5}$	 B1 for $2y^4$ B1 for $3x^5$
(b)(i)	$(y-2)(4x+1)$	B1 , B1
(ii)	$(y-2)(4x+1) = 0$ $y = 2$ or $x = -\frac{1}{4}$	√ √B1 for both correct values
10(a)	For the vertical bars, the area of each bar is not directly proportional to the height, hence readers might be misled that the amount spent on hotel stays in 2021 is about 4 times that in 2020 instead of only 2 times as shown by the height. [Accept other reasonable responses]	B1 for misleading fact B1 for explanation of why this misleading fact cause misinterpretation.
(b)	The chart **does not support her claim** because between 2021 and 2022, the amount spent on flight increases but the amount spent on hotel stays decreases. [Accept other reasonable responses]	B1

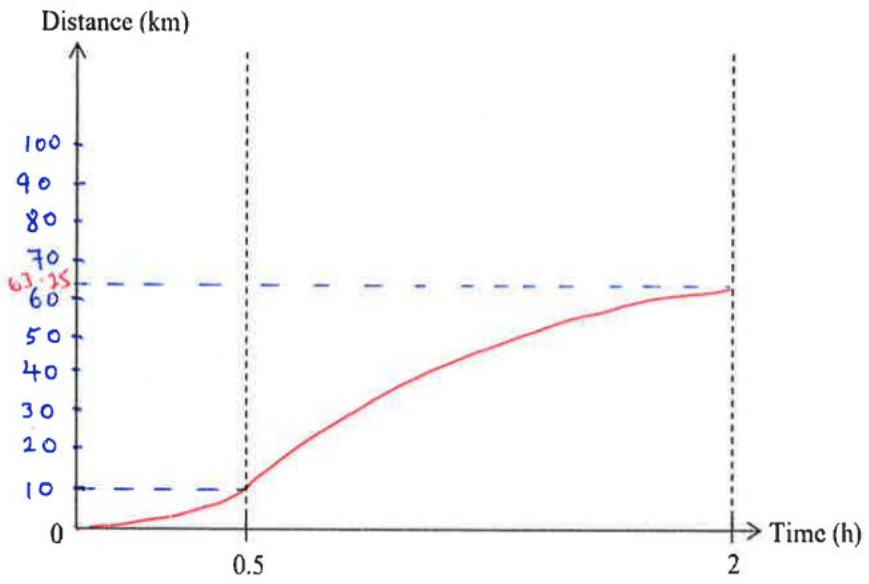
No.	Answers	Marks
11(a) **(i)**	$\subset$	B1
(ii)	$\notin$	B1
(b)		B1
(c)(i)	$x = 21$	B1
(ii)	$\left(\frac{21}{120}\times\frac{20}{119}\times\frac{74}{118}\right)+\left(\frac{74}{120}\times\frac{21}{119}\times\frac{20}{118}\right)+\left(\frac{21}{120}\times\frac{74}{119}\times\frac{20}{118}\right)$ $=\frac{111}{2006}$ or 0.0553 Alternative Method $\left(\frac{21}{120}\times\frac{20}{119}\times\frac{74}{118}\right)\times 3=\frac{111}{2006}$ or 0.0553	M1 for $\frac{21}{120}\times\frac{20}{119}\times\frac{74}{118}$ seen M1 for addition A1 M2 + A1
12	3, 5, 5, 7, 10 or 4 , 5, 5, 5, 11	B1
13(a)	10 : 4 : 7	B1
(b)	Flour : Sugar : Butter 1500 : 500 : 1000 $1500 \div 250 = 6$ $500 \div 100 = 5$ $1000 \div 175 = 5$ Maximum number of biscuits made $= 5\times 25$ $= 125$	 M1 A1

No.	Answers	Marks
14(a)	$x^2-5x+9=\left(x-2.5\right)^2-\frac{25}{4}+9$ $=\frac{11}{4}+\left(x-2.5\right)^2$ $p=\frac{11}{4}$ or $p=2.75$	 B1
(b)	$x=\frac{5}{2}$ or $x=2.5$	B1
15(a)	$y=-\frac{2}{5}x+4$	B1 for the correct gradient B1 for the correct y-intercept
(b)	Let the shortest distance from P to line L be h . Let θ be the angle made between the line and the *x*-axis. $\tan\theta=\frac{4}{10}\Rightarrow\theta=21.8014^0$ $\frac{h}{7}=\sin 21.8014$ $h=7\times0.713\approx2.60$ <u>Alternative Method</u> $\frac{h}{4}=\frac{7}{\sqrt{116}}$ $h=\frac{28}{\sqrt{116}}\approx2.60$	 M1 M1 A1 M1 , B1 for $\sqrt{116}$ seen A1
16	Interior angle of polygon A $=360^0-135^0-60^0=165^0$ Let n be the number of sides of polygon A. $\frac{(n-2)\times180}{n}=165$ $180n-360=165n$ $n=\frac{360}{15}=24$	B1 M1 A1

No.	Answers	Marks
17	$P = \dfrac{k}{\sqrt{Q}}$ $\dfrac{k}{\sqrt{9}} + \dfrac{k}{\sqrt{16}} = 21$ $\dfrac{k}{3} + \dfrac{k}{4} = 21$ $\dfrac{7k}{12} = 21$ $7k = 252$ $k = 36$ $\dfrac{36}{\sqrt{Q}} = 100$ $Q = \left(\dfrac{36}{100}\right)^2 = 0.1296$ [Accept $\dfrac{81}{625}$]	M1 M1 A1
18(a)	Perimeter $= \dfrac{216}{360} \times 2 \times \pi \times 10 + 20$ $= 12\pi + 20$	M1 for $\dfrac{216}{360} \times 2 \times \pi \times 10$
(b)	$2\pi r = 12\pi$ $r = 6$ Height of the cone $= \sqrt{10^2 - 6^2} = 8$ Volume of the cone $= \dfrac{1}{3} \times \pi \times 6^2 \times 8$ $= 301.59 \approx 302$	M1 M1 M1 A1
19	$AD = BC$ (opposite length of parallelogram) $\angle EAD = \angle ADB = \angle DBC$ (alternate angle) $\angle EDA = \angle EDP - \angle ADP$ $= \angle DPC - \angle DBC$ (alternate angle) $= \angle PCB$ (exterior angle) $\therefore \Delta BCP \equiv \Delta ADE$ (ASA)	B1 B1 B1 for using alternate angle B1 for using exterior angle or other equivalent reason to conclude that $\angle EDA = \angle PCB$ A1 for ASA shown

No.	Answers	Marks
20(a) (i)	6 , 12, 22, 36	B1
(ii)	$2n^2+4=2(n^2+2)$ is a multiple of 2 for all values of n , hence it is an even number and not an odd number.	B1
(b)	$2k^2-3$	B1
21	$\frac{4x+5}{x}=\frac{4x+11}{x+2}$ $(4x+5)(x+2)=x(4x+11)$ $4x^2+13x+10=4x^2+11x$ $2x=-10$ $x=-5$	M1 M1 A1
22(a)	47	B1
(b)	20.5	B1
(c)	1. On average Team B scored more points than Team A as their median score was 53 which was higher than the median score of 47 achieved by Team A. 2. The interquartile range of Team B was higher than that of Team A which was 17.5. Hence the scores for Team B was more widely spread out.	B1 B1
(d)	There is **an outlier** in the distribution scores of Team A which is significantly greater than the rest of the scores.	B1

No.	Answers	Marks
23(a)	$\begin{pmatrix} 560 & 420 & 140 \\ 490 & 280 & 280 \end{pmatrix}$	B1
(b)	$T = \begin{pmatrix} 1.25 & 2.50 \end{pmatrix}\begin{pmatrix} 560 & 420 & 140 \\ 490 & 280 & 280 \end{pmatrix}$ $= \begin{pmatrix} 1925 & 1225 & 875 \end{pmatrix}$	 B1
(c)	The total cost of the small and large vegetarian pies	B1
24(a)	$\angle DOB = 68 \times 2 = 136^0$ (angle at centre = twice angle on circumference) $\angle BCD = 180 - 68 = 112^0$ (angles in opposite segment) $\angle ODC = 360 - 52 - 136 - 112 = 60^0$ (sum of angles in a quadrilateral is 360°)	B1 for correct reasoning B1 for correct reasoning B1
(b)	Area of the shaded segment = Area of sector OCB − Area of triangle OCB $= \frac{76}{360} \times \pi \times 5^2 - \frac{1}{2} \times 5^2 \times \sin 76^0$ $= 4.451932$ $= 4.45 \text{ cm}^2$	 M1 , M1 A1

No.	Answers	Marks
25	Curved surface of the small hemisphere $= 2\pi(3.6)^2 = 25.92\pi \text{ cm}^2$ Curved surface area of the cylinder $= 2\pi(3.6)(6.5) = 46.8\pi \text{ cm}^2$ Total surface area of the large hemisphere $= 2\pi(5.4)^2 + \pi(5.4^2 - 3.6^2) = 74.52\pi \text{ cm}^2$ Total surface area of the **solid** $25.92\pi + 46.8\pi + 74.52\pi = 462.56 \approx 463 \text{ cm}^2$	M1 M1 M1 , M1 A1
26(a)	$\frac{40 - v}{0.5 - 2} = -6$ $v = 31$	M1 A1
(b)		B1 for correct curve drawn from t = 0 to t=0.5h B1 for correct curve drawn from t = 0.5h to t = 2h B1 for values 10 and 63.25 labelled correctly on the vertical axis