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	Class	Register Number
Name		

4048/01 **16/S4PR2/EM/1**

MATHEMATICS **PAPER 1**

Friday **29 July 2016** **2 hours**

VICTORIA SCHOOL

PRELIMINARY EXAMINATION TWO
SECONDARY FOUR

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 paper clips, highlighters, glue or correction fluid.

Answer **all** the 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 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 number of marks for this paper is 80.

1 Calculate $\frac{\sqrt{0.00234 \times 9.45}}{29.5}$, giving your answer correct to

(a) 5 decimal places,

Answer (a)..... [1]

(b) 5 significant figures.

Answer (b)..... [1]

---

2 A sequence of numbers is given as follows;

1st line: $1^2 + 1 - 1 = 1$

2nd line: $2^2 + 2 - 1 = 5$

3rd line: $3^2 + 3 - 1 = 11$

4th line: $4^2 + 4 - 1 = 19$

(a) Write down an expression, in terms of n, for the nth term in the sequence.

Answer (a)..... [1]

(b) Calculate the value of the 67th term of the sequence.

Answer (b)..... [1].

---

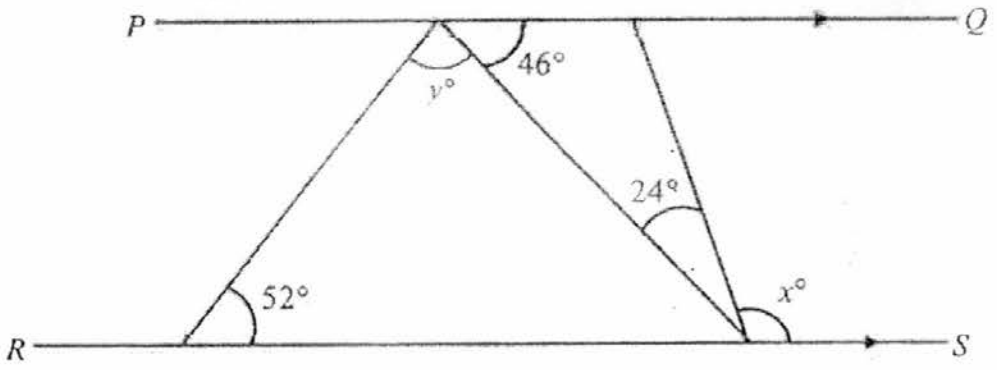
3 (a) Given that $3^4 \times 3^{\frac{2}{x}} = 3^{-\frac{1}{2}}$, find the value of x.

Answer (a) $x =$..... [1]

(b) Light travels 1 metre in 3.3 nanoseconds.
Find the total distance, in metres, that light will travel in 6.6 microseconds.

Answer (b).....m [1]

4



PQ is parallel to RS.

(a) Find x.

Answer (*a*) $x =$ ..... [1]

(b) Find y.

Answer (*b*) $y =$ ..... [1]

---

5 A group of students were asked to determine which of the following allows more water to flow through in a given time:

A	Two hoses with diameters of 5 cm each.	OR	B	A hose with a diameter of 8 cm.

Paul chooses *A*. His reasoning is that the two hoses have a bigger combined diameter of $5 + 5 = 10 > 8$. Is Paul right? Explain.

Answer.....

.....

.....[2]

---

6 Simplify $36b^2 - 25(1-b)^2$.

Answer ..... [2]

---

7 Some students were interviewed to find out the languages they spoke at home.

$\varepsilon = \{\text{The set of students who were interviewed}\}$

$E = \{\text{The set of students who spoke English}\}$

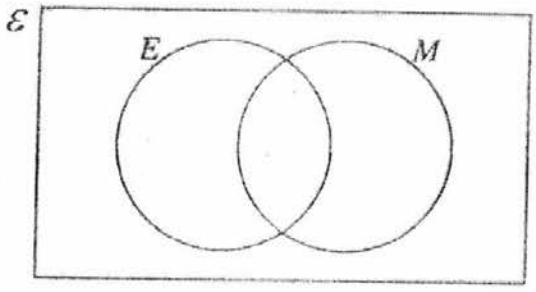
$M = \{\text{The set of students who spoke their Mother Tongue}\}$

(a) Describe, as simply as possible, in words, the set $M \cap E'$.

Answer (a) .....

.....[1]

(b) On the Venn Diagram, shade the region which represents $E \cup (M \cup E)'$.



[1]

It is given that $n(\varepsilon) = 256$, $n(E) = 195$ and $n(M) = 123$.

(c) If $M \subset E$, find the number of students who did not speak either English or their Mother Tongue.

Answer (c)..... [1]

---

8 (a) Factorise $x^2 - 2xy + y^2$.

Answer (a)..... [1]

(b) Factorise completely $x^3 - 3x^2 - 4x + 12$.

Answer (b)..... [2]

---

9 Boris and Bram jog on a circular track with radius 15 m. Boris jogs with a constant speed of 0.15π ms^{-1} and Bram jogs with a constant speed of 0.25π ms^{-1}. If both boys start jogging in the opposite direction from point A at 08 10, when will they meet again at A?

Answer ..... [3]

---

10 Two similar marbles made from the same material have radii in the ratio of 2 : 5.

(a) If it costs \$2 to paint the small marble, calculate the cost to paint the large marble using the same paint.

Answer (a) \$ ..... [1]

(b) If the mass of the larger marble is 250 g, what is the mass of the smaller marble?

Answer (b).....g [2]

---

11 A painter takes 4 days to paint a house. His apprentice takes 2 more days to paint the same house.

(a) Find the number of similar houses that the apprentice can paint in 30 days.

Answer (a).....houses [1]

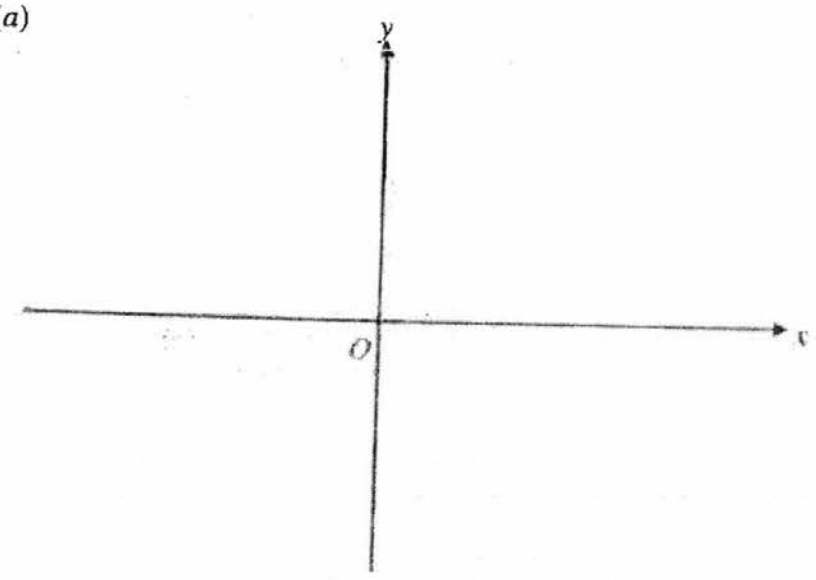
(b) If the painter and the apprentice paint the house together, how many days will it take the both of them to complete painting 1 house?

Answer (b).....days [2]

---

12 (a) Sketch the graph of $y = 2 - \frac{1}{2}(x+2)^2$.

Answer (a)



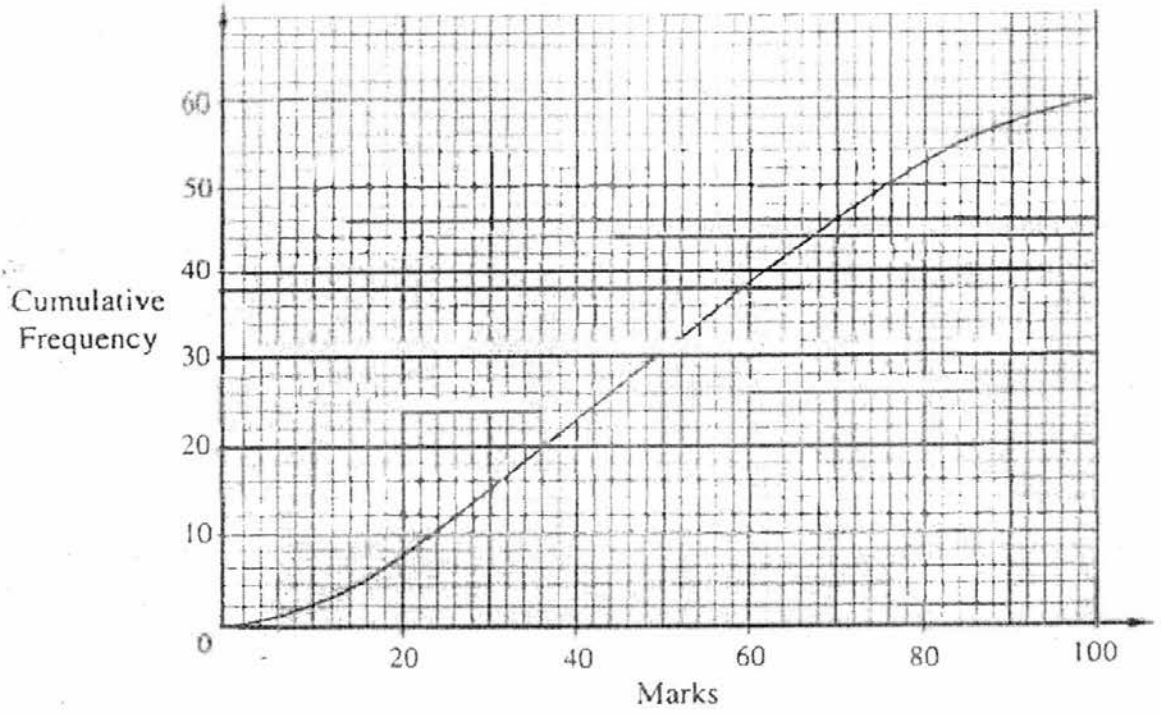
[2]

(b) Write down the equation of the line of symmetry of the graph of $y = 2 - \frac{1}{2}(x+2)^2$.

Answer (b)..... [1]

---

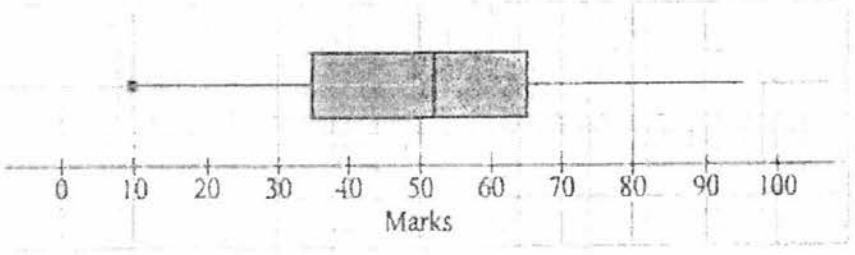
13 The cumulative frequency curve below shows the marks obtained, out of 100, by 60 students in an Elementary Mathematics paper.



(a) Find interquartile range of the distribution.

Answer (a).....marks [1]

(b) The same 60 students also sat for the Additional Mathematics paper. The box-and-whisker diagram below illustrates the marks obtained. The maximum mark was again 100.



A parent commented that the Elementary Mathematics paper was easier than the Additional Mathematics paper.

Do you agree? Give a reason for your answer.

Answer (b) .....because.....

.....

.....[2]

14 The period of oscillation, T seconds of a string varies directly as the square root of the length of the string, l cm. When the length of the string is 36 cm, the period of the oscillation is 0.3 seconds.

(a) Find the length of the string when the period of oscillation is 0.4 seconds.

Answer (a).....cm [2]

(b) Calculate the percentage change in l if T is decreased by 30%.

Answer (b).....% [2]

---

15 (a) The lowest point of a quadratic curve is $(-1,-6)$. It intersects the y-axis at -5. Write down the equation of the curve in the form $y=a(x+b)^2+c$, where a, b, c are integers.

Answer (a) y =..... [2]

(b) Hence solve the equation $a(x+b)^2+c=0$, giving your answers correct to two decimal places.

Answer (b) x =..... [2]

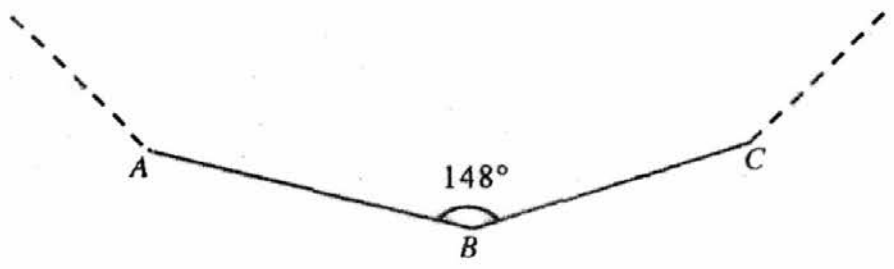
---

16 (a) Is it possible to draw a regular polygon whose exterior angle is $7°$?
Give a reason for your answer.

Answer (a).....

..... [2]

(b)



In the diagram above, $ABC...$ is part of a polygon. $\angle ABC$ is $148°$. The size of the remaining interior angles are each equal to $139°$. Find the number of sides of this polygon.

Answer (b)..... [2]

---

17 Vernon travels to school either by bus or by car. The probability of being late for school is $\frac{1}{5}$ if he travels by bus and $\frac{1}{20}$ if he travels by car.

(a) Find the probability that he will be late on just two out of three days if he travels by bus on three consecutive days.

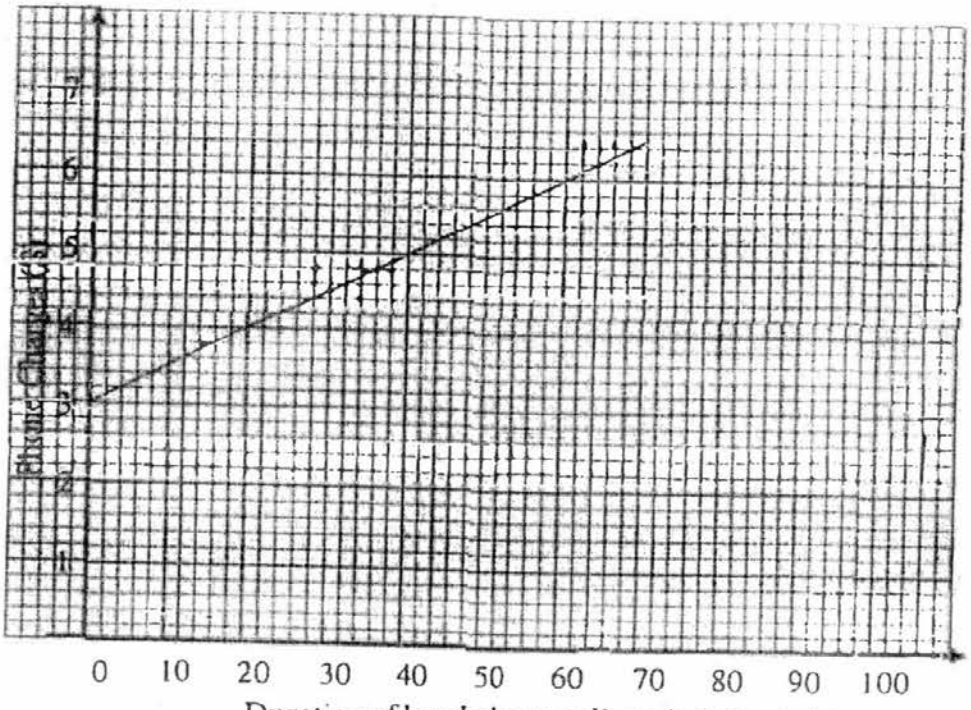
Answer (a)..... [2]

(b) If the probability that he travels by bus is $\frac{2}{3}$, find the probability that he will be late for school on any given day.

Answer (b)..... [2]

---

18 The graph shows the charges made by a telecommunication company for making local phone calls lasting up to 70 minutes. The total cost is made up of a fixed charge, \$3.00, together with a charge of \$x per minute for making local phone calls.



[1]

(a) State the cost of making 44 minutes of local phone call.

Answer (*a*) \$ ..... [1]

(b) (i) A second telecommunication company that does not have a fixed charge, charges 8¢ per minute for the first 50 minutes and 15¢ per minute after that.

Draw a graph, on the same axes, to represent the charge made by this second company.

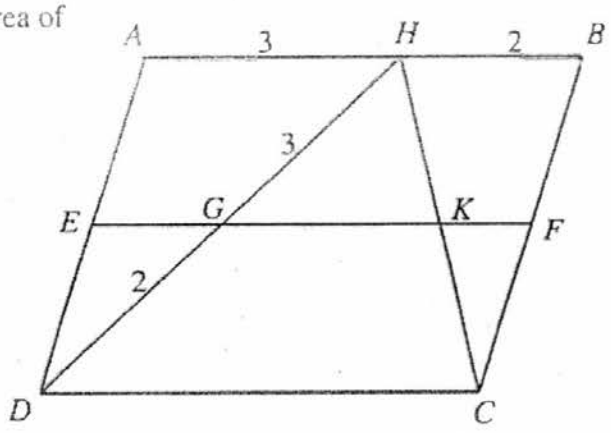
(ii) Find the range of times, T, for which it would be cheaper to subscribe to the second company.

Answer (*b*)(*ii*) ..... [1]

19 In the diagram, $ABCD$ is a parallelogram with $EF // AB$, $AH = GH = 3$ cm and $HB = DG = 2$ cm. EF intersects HD and HC at G and K respectively.

If the area of $\Delta GHK = 18\ \text{cm}^2$, find the area of

(a) triangle DHC,



Answer (a)..... cm^2 [2]

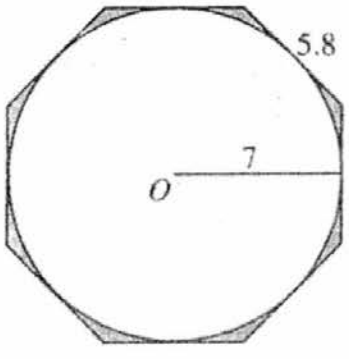
(b) triangle BCH.

Answer (b)..... cm^2 [2]

---

20 The diagram shows a circle with centre O and radius 7 cm inscribed in a regular octagon of sides 5.8 cm each.

(a) Calculate the area of the octagon.



Answer (a)..... cm^2 [2]

(b) Find the total area of the shaded region between the circle and the octagon.

Answer (b)..... cm^2 [2]

21 (a) Solve the equation $\frac{x-3}{2} - 5 = \frac{7}{2}x$.

Answer (a) $x =$ ..... [2]

(b) 216 cubes, each having edges of 2.6 cm, measured to the nearest 0.1 cm, fit exactly into a

(i) greatest possible length of the cubic box,

Answer (b)(i) ..... cm [2]

(ii) least possible volume of the cubic box.

Answer (b)(ii) ..... cm^3 [1]

---

22 The equation of a straight line is $\frac{x}{3} - \frac{y}{4} = 1$.

(a) Find the gradient of the line.

Answer (a) ..... [1]

(b) Find the equation of the line, parallel to $\frac{x}{3} - \frac{y}{4} = 1$, which passes through the point $\left(1\frac{1}{2}, \frac{1}{2}\right)$.

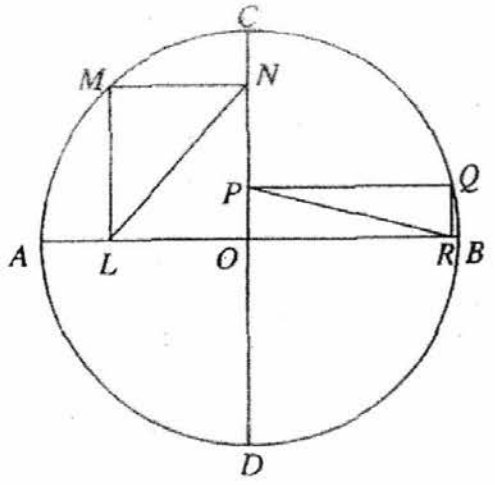
Answer (b) ..... [2]

(c) Find the distance between the points at which these two lines cut the x-axis.

Answer (c) ..... units [2]

---

23 (a) In the diagram, O is the centre of the circle $ADBC$. AB and CD are two perpendicular diameters. L and R are points on AB. N and P are points on CD. M and Q are points on the circumference of the circle. $LMNO$ and $OPQR$ are two rectangles.



Explain briefly why LN and PR are equal in length.

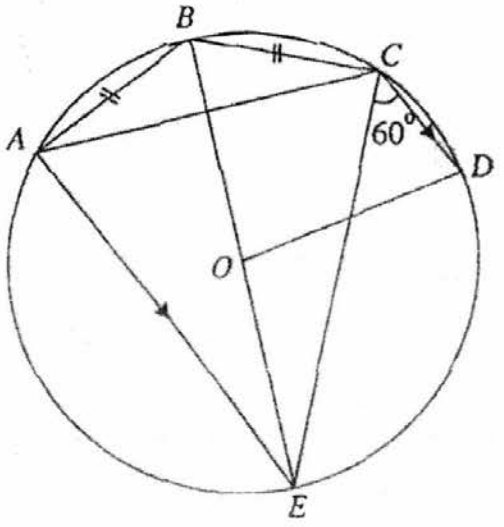
Answer (a) .....

.....

..... [2]

(b) In the diagram, the points A, B, C, D and E lie on a circle, centre O.
BOE is a diameter, $AB = BC$, $\angle ECD = 60°$.
AE is parallel to CD.

(i) Find $\angle AEB$.



Answer (b)(i) $\angle AEB =$ ..... ° [2]

(ii) Hence show that triangle ACE is an equilateral triangle.

Answer (b)(ii) .....

.....

.....

..... [1]

24 The point H represents the position of a harbour located along a coastline. Another point J represents the position of a jetty situated along the same coastline. The point L represents the position of a lighthouse.
It is given that $HJ = 1800$ m, $\angle LHJ = 26°$ and $\angle HJL = 93°$.

(a) Using a scale of 1: 20000, construct the $\triangle HJL$. [2]

Answer (a) and (c)

H•

(b) Measure and write down the distance LH.

Answer (b) ..... m [1]

(c) A yacht sails directly from H to L. By drawing a suitable line, measure and write down its closest distance to the jetty.

Answer (c) ..... m [2]

End of Paper

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2016 Victoria School Prelim 2 Mathematics Paper 1 Answer Key

1a	0.00504
1b	0.0050408
2a	n^2+n-1
2b	4555
3a	$x=-\frac{4}{9}$
3b	2000 m
4a	$x=110$
4b	$y=82$
5	No, Paul is wrong. The hose in B with a larger cross sectional area allows more water to flow through than in A.
6	$(11b-5)(b+5)$
7a	$M \cap E'$ is the set of students who spoke only in their Mother Tongue at home
7b	
7c	61 students
8a	$(x-y)^2$
8b	$(x-2)(x+2)(x-3)$
9	0820
10a	\$12.50
10b	16g
11a	5 days
11b	$2\frac{2}{5}$ days
12a	
12b	$x=-2$
13a	39 marks
13b	Disagree. Median marks in Elementary Mathematics paper is lower.
14a	64
14b	Increase by 69%
15a	$y=x^2+2x-5$
15b	$x=-3.45$ or $x=1.45$
16a	No. 360° is not divisible by 7
16b	9 sides
17a	$\frac{12}{125}$
17b	$\frac{3}{20}$
18a	\$5.20
18bii	$0 \le T < 65$
19i	50

19ii	20
20a	162.4
20b	8.4
21a	$-2\frac{1}{6}$
21bi	15.9
21bii	3581.577
22a	$1\frac{1}{3}$
22b	$6y = 8x - 9$
22c	$1\frac{7}{8}$
23b	30°
24a	Constructions
24b	2055 m
24c	790 m

	Class	Register Number
Name ______________________		

4048/02 | 16/S4PR2/EM/2

MATHEMATICS | **PAPER 2**

Tuesday | **2 August 2016** | **2 hours 30 minutes**

VICTORIA SCHOOL

PRELIMINARY EXAMINATION TWO
SECONDARY FOUR

Additional Materials: Answer Paper
Graph Paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the work you hand in.
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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, unless the question requires the answer in terms of π.

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 number of marks for this paper is 100.

Answer all the questions.

1 (a) Victor and Gloria are in an organic farm in Murai Farmway with their families. Victor buys five pieces of tofu and four packets of mushroom for $23.55. Gloria buys four pieces of tofu and three packets of mushroom. She pays with two $10 notes and receives change of $1.80.

(i) Write down a pair of simultaneous equations to represent this information. Use t to represent the cost, in dollars, of a piece of tofu and m to represent the cost, in dollars, of a packet of mushrooms. [2]

(ii) Solve your simultaneous equations to find t and m. [2]

(iii) Calculate the total cost of buying two pieces of tofu and five packets of mushroom. [1]

(b) Solve the equation $3+13x-4x^2=0$, giving the answers correct to three decimal places. [4]

---

2 (a) (i) Express 8064 as the product of its prime factors. [1]

(ii) Find the value of k such that $\frac{8064}{k}$ is the largest possible perfect cube. [1]

Given that $p=2^3\times3^4\times7$. Write down the

(iii) lowest common multiple of 8064 and p, giving your answer as the product of its prime factors, [1]

(iv) greatest integer that will divide both 8064 and p exactly. [1]

(b) When n is a whole number, $2n+1$ is an odd number.

(i) Write down an expression for the next two consecutive odd numbers after $2n+1$. [1]

(ii) Find and simplify an expression for the difference between the squares of the two consecutive odd numbers found in (b)(i). [2]

(iii) Hence, explain why the difference between the squares of two consecutive odd numbers is always a multiple of 8. [1]

3 The table below shows the ticket prices at the Singapore Garden Festival held at Gardens by the Bay.

Ticket	Price
Adult	\$20
Child	\$12
Senior Citizen	\$15

(a) Represent the ticket price for adult, child and senior citizen by a column matrix **Q**. [1]

(b) Mr Ang bought 4 adults, 2 children and 1 senior citizen tickets to the festival. Write down a matrix **P** such that the matrix multiplication $\mathbf{R} = \mathbf{PQ}$ gives the total amount Mr Ang paid for the tickets. Hence, find **R**. [2]

(c) The table below shows the number of tickets sold at the festival.

Number of tickets sold			
Day	Adult	Child	Senior Citizen
Monday	81	c	36
Tuesday	85	42	s

(i) The ticket sales collected on Monday and Tuesday was \$2724 and \$2744 respectively.
Represent these ticket sales in a 2×1 matrix **T**. [1]

(ii) Form a matrix multiplication such that the product will be **T**. [1]

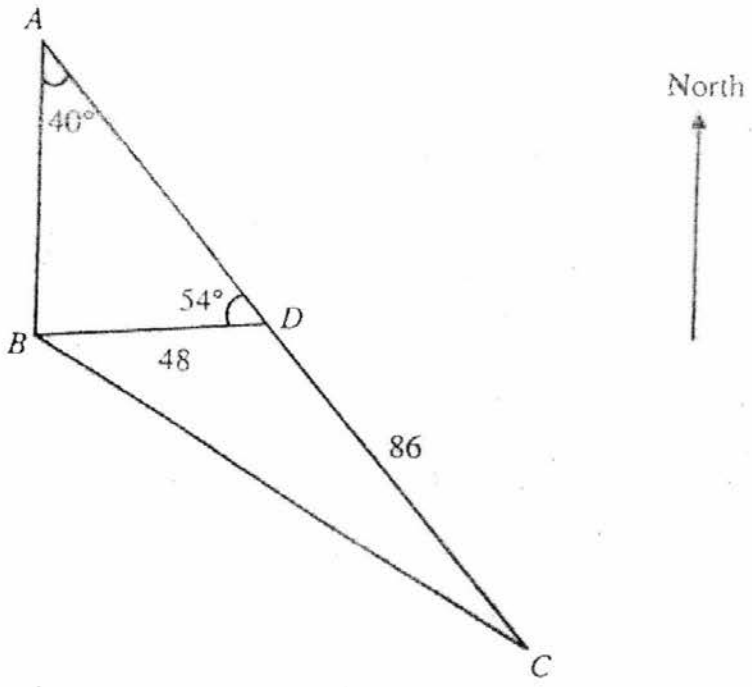
(iii) Find the value of c and of s. [2]

Gardens by the Bay donated part of their ticket sales to a charity organization. **U** represents the total amount of money donated to the organization on Monday and Tuesday.

(iv) Evaluate the matrix $\mathbf{U} = (0.15 \quad 0.1)\mathbf{T}$. [1]

(v) Explain what the elements of the matrix $(0.15 \quad 0.1)$ represent. [1]

4



ABD and BCD are two horizontal triangular plots of land.
$BD = 48$ m and $CD = 86$ m.
Angle $BAD = 40°$ and angle $BDA = 54°$.
A is due north of B and ADC is a straight line.

(a) Calculate

(i) AD, [2]

(ii) the total area of the plots of land $ABCD$, [2]

(iii) BC. [2]

(b) Given that Z is a point on CD such that $ZD = 48$ m, calculate the bearing of B from Z. [2]

(c) The base of a vertical mast is at B.
The greatest angle of elevation of the top of the mast from a point on AC is 17.4°.

Calculate the angle of depression of C when viewed from the top of the mast. [3]

5 (a) Simplify $\frac{16a^3b^4}{7c^4} \div \frac{4ab^2}{21c^3} \times \frac{27a^{n+1}}{8a^{n-2}}$. [2]

(b) Simplify $\frac{2u+18v}{(u+4v)^2-25v^2}$. [2]

(c) (i) Solve the inequality $\frac{6x}{7} - \frac{3}{8} \leq x+2\frac{1}{4}$. [1]

(ii) Hence, state the smallest integer value of x such that $\frac{6x}{7} - \frac{3}{8} \leq x+2\frac{1}{4}$. [1]

(d) (i) Express as a single fraction in its simplest form $\frac{h}{4-h} - \frac{1}{h+3}$. [2]

(ii) Solve the equation $\frac{h}{4-h} - \frac{1}{h+3} = \frac{4}{5}$. [3]

---

6 **Answer the whole of this question on a sheet of graph paper.**

The variables x and y are connected by the equation

$$y = x + \frac{12}{x} - 5.$$

Some corresponding values of x and y are given in the table below.

x	1	1.5	2	3	4	5	6	7	8
y	8	p	3	2	2	2.4	3	3.7	4.5

(a) Calculate the value of p. [1]

(b) Using a scale of 2 cm to represent 1 unit, draw a horizontal x-axis for $0 \leq x \leq 8$.
Using a scale of 2 cm to represent 1 unit, draw a vertical y-axis for $0 \leq y \leq 8$.

On your axes, plot the points given in the table and join them with a smooth curve. [3]

(c) Use your graph to find the solutions of $x + \frac{12}{x} = 8\frac{1}{5}$. [1]

(d) By drawing a tangent, find the gradient of the curve at $(6, 3)$. [2]

(e) By drawing a suitable straight line on your graph, solve $2x^2 - 11x + 12 = 0$. [2]

7 **(a)** A is a point $(-4, 1)$, $\overrightarrow{AB} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$ and $\overrightarrow{AC} = \begin{pmatrix} -3 \\ 8 \end{pmatrix}$.

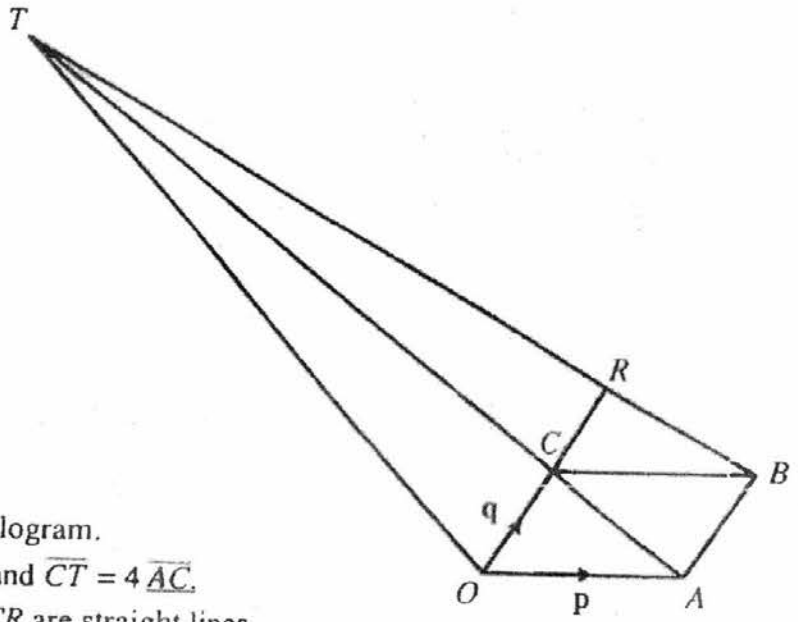
(i) Write down the column vector $\overrightarrow{BC}$. [1]

(ii) Find $\left|\overrightarrow{BC}\right|$. [2]

(iii) P is a point such that $\overrightarrow{BP} = 2\overrightarrow{PC}$.
Find the column vector $\overrightarrow{AP}$. [2]

(iv) Given $\overrightarrow{OQ} = \begin{pmatrix} \frac{2}{3} \\ 11\frac{2}{3} \end{pmatrix}$.
What type of quadrilateral is $APQB$?
Justify your answer using vectors. [3]

(b)



$OABC$ is a parallelogram.
$\overrightarrow{OA} = \mathbf{p}$, $\overrightarrow{OC} = \mathbf{q}$ and $\overrightarrow{CT} = 4\overrightarrow{AC}$.
ACT, BRT and OCR are straight lines.

(i) Express each of the following, as simply as possible, in terms of $\mathbf{p}$ and/or $\mathbf{q}$,

(a) $\overrightarrow{OB}$, [1]

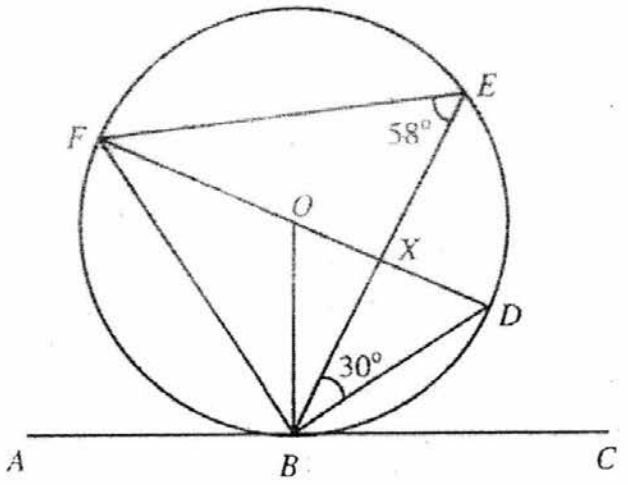
(b) $\overrightarrow{OT}$, [1]

(c) $\overrightarrow{BT}$. [1]

(ii) Given that $\overrightarrow{BR} = \frac{4}{5}\mathbf{q} - \mathbf{p}$, find k if $\overrightarrow{OC} = k\overrightarrow{CR}$. [1]

(iii) Find the value of $\dfrac{\text{area of } \Delta BCR}{\text{area of } \Delta OCT}$ [1]

8 (a)



The line DF is a diameter of the circle $BDEF$ with centre O.
ABC is a tangent to the circle at B.
X is the point of intersection of DF and BE.
Angle $DBE = 30°$ and angle $BEF = 58°$.

(i) Find

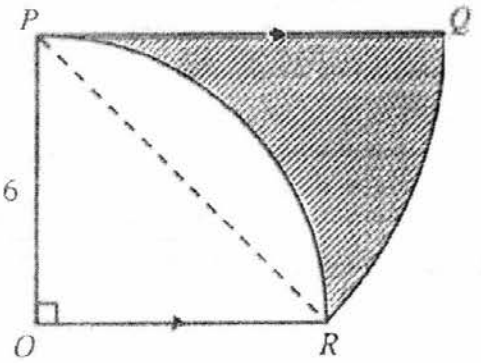
(a) angle FBO, [2]

(b) angle ABF, [1]

(c) angle DXE. [1]

(ii) Given that the radius of the circle is 14 cm, find the area of triangle BDF. [2]

(b)



In the diagram, POR is a quadrant of a circle with radius 6 cm.
OR and PQ are parallel.
QR is an arc of a circle with centre P.

Calculate the area and the perimeter of the shaded region. [4]

9 (a) The ages of 50 employees in Company V is shown in the table below.

Age in years	$24 < x \leq 28$	$28 < x \leq 32$	$32 < x \leq 36$	$36 < x \leq 40$	$40 < x \leq 44$
Number of employees	7	10	13	8	p

(i) State the value of p. [1]

(ii) Hence, calculate the

(a) mean age of the employees, [1]

(b) standard deviation. [1]

(iii) The age distribution of 50 employees in Company W is summarized below.

Mean	29.6 years
Standard deviation	7.13 years

Make two comparisons between the ages of employees in both companies. [2]

(b) A box contains 5 red flags and 8 yellow flags.
Two flags are taken from the bag at random without replacement.

(i) Draw a tree diagram to show the probabilities of the possible outcomes. [2]

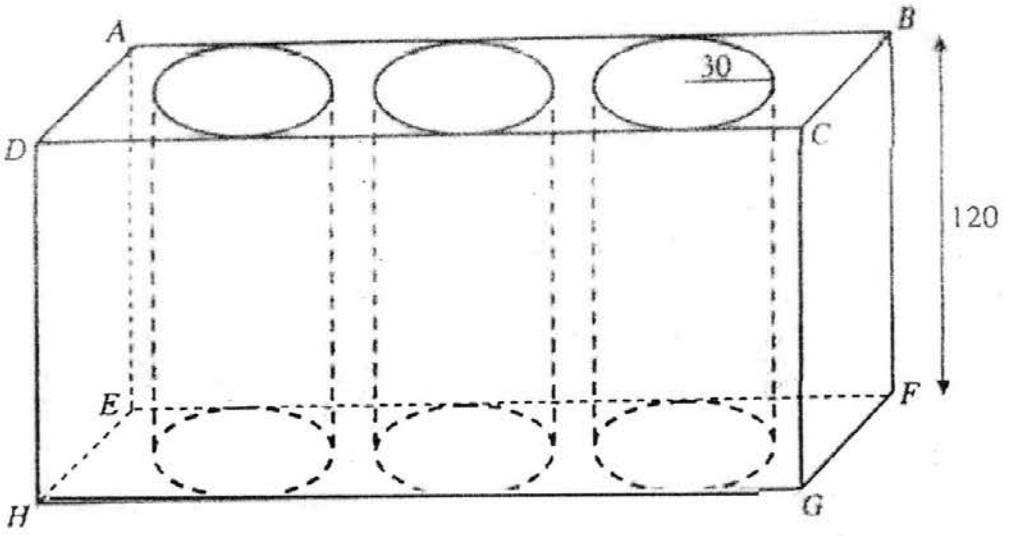
(ii) Find, as a fraction in its simplest form, the probability that

(a) the first flag is red and the second flag is yellow, [1]

(b) both flags are the same colour, [1]

(c) at least one flag is yellow. [1]

10



Class 4*V* has chosen the 'Go Green' theme for their Social Innovation Project.
The diagram above shows the recycling bins structure that they have built.

The whole structure consists of 3 open identical cylindrical plastic containers fit into a wooden cuboid crate. All the containers and the crate are of negligible thickness.

3 circles had to be cut from the top of the crate to fit the containers.
Each plastic container is placed in the crate such that they are 20 cm away from the sides of the crate, *ADHE* and *BCGF*, as well as 20 cm apart from each other.
Each plastic container touches the base and sides, *ABFE* and *DCGH*, of the crate too.
The radius and height of the plastic container are 30 cm and 120 cm respectively.

(a) Write down the dimensions of the crate. [1]

(b) Calculate the

(i) exact total surface area of the crate that was cut out, [1]

(ii) exact total internal surface area of each cylindrical container, [2]

(iii) total **exposed** external surface area of the crate. [2]

(c) The class would like to paint all the exposed external surfaces of the crate yellow. One tin of paint can cover an area of 3.75 m^2. How many tins do they need to purchase? Justify your answer. [2]

(d) If each cylindrical container is filled to the brim, what is the maximum volume of recyclables that can be collected by the class in a single collection? [2]

End of Paper

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2016 Victoria School Prelim 2 Mathematics Paper 2 Answer Key

1a(i)	$5t + 4m = 23.55$ $4t + 3m = 18.20$
1a(ii)	$t = 2.15$ and $m = 3.20$
1a(iii)	\$ 20.30
1b	$x = -0.216$ (3 d.p.) or $x = 3.466$ (3 d.p.)
2a(i)	$8064 = 2^7 \times 3^2 \times 7$
2a(ii)	$k = 126$
2a(iii)	$2^7 \times 3^4 \times 7$
2a(iv)	504
2b(i)	$(2n+3)$ and $(2n+5)$
2b(ii)	$8(n+2)$
2b(iii)	Since 8 is a factor of $8(n+2)$, the difference between two consecutive odd numbers will always be a multiple of 8.
3(a)	$\mathbf{Q} = \begin{pmatrix} 20 \\ 12 \\ 15 \end{pmatrix}$
3(b)	$\mathbf{P} = (4 \quad 2 \quad 1)$ $\mathbf{R} = (4 \quad 2 \quad 1)\begin{pmatrix} 20 \\ 12 \\ 15 \end{pmatrix}$ $= (119)$
3(c)(i)	$\mathbf{T} = \begin{pmatrix} 2724 \\ 2744 \end{pmatrix}$
3(c)(ii)	$\begin{pmatrix} 81 & c & 36 \\ 85 & 42 & s \end{pmatrix}\begin{pmatrix} 20 \\ 12 \\ 15 \end{pmatrix} = \begin{pmatrix} 2724 \\ 2744 \end{pmatrix}$
3(c)(iii)	$c = 47$ and $s = 36$
3(c)(iv)	(683)
3(c)(v)	Elements of $(0.15 \quad 0.1)$ represent the **percentage** of the **total ticket sales** that Gardens by the Bay had **donated** to the charity organization on **Monday and Tuesday respectively**
4(a)(i)	74.5 m (3 s.f.)
4(a)(ii)	3120 m^2 (3 s.f.)
4(a)(iii)	121 m (3 s.f.)
4(b)	293°
4(c)	5.8° (1 d.p.)

5(a)	$\frac{81a^5b^2}{2c}$
5(b)	$\frac{2}{u-v}$
5(c)(i)	$x \geq -18\frac{3}{8}$
5(c)(ii)	-18
5(d)(i)	$\frac{h^2+4h-4}{(4-h)(h+3)}$
5(d)(ii)	$h=-3\frac{7}{9}$ or $h=2$
6(a)	$p=4.5$
6(c)	$x=1.9$ or $x=6.3$
6(d)	0.660 (3 s.f.)
6(e)	$x=1.5$ or $x=4$
7(a)(i)	$\begin{pmatrix}-8\\4\end{pmatrix}$
7(a)(ii)	8.94 units (3 s.f.)
7(a)(iii)	$\begin{pmatrix}\frac{-1}{3}\\6\frac{2}{3}\end{pmatrix}$
7(a)(iv)	$\overrightarrow{AP}=\overrightarrow{BQ}$ and $\overrightarrow{AB}=\overrightarrow{PQ}$ $\lvert\overrightarrow{AP}\rvert=\lvert\overrightarrow{BQ}\rvert$ and $\lvert\overrightarrow{AB}\rvert=\lvert\overrightarrow{PQ}\rvert$ Thus, $APQB$ is a parallelogram.
7(b)(i)(a)	$\underset{\sim}{p}+\underset{\sim}{q}$
7(b)(i)(b)	$5\underset{\sim}{q}-4\underset{\sim}{p}$
7(b)(i)(c)	$4\underset{\sim}{q}-5\underset{\sim}{p}$
7(b)(ii)	$k=1\frac{1}{4}$
7(b)(iii)	$\frac{1}{5}$
8(a)(i)(a)	32°
8(a)(i)(b)	58°
8(a)(i)(c)	88°
8(a)(ii)	176 cm^2 (3 s.f.)
8(b)	Area of shaded region = 18 cm^2 Perimeter of shaded region = 24.6 cm (3 s.f.)

9(a)(i)	$p = 12$
9(a)(ii)(a)	34.64 years
9(a)(ii)(b)	5.45 years (3 s.f.)
9(a)(iii)	The employees in company W are younger than those in company V since the mean age of employees in company W is lower than that of company V. The spread of ages of employees in company W is wider since the standard deviation of ages of employees in company W is larger than that of company V.
9(b)(ii)(a)	$\frac{10}{39}$
9(b)(ii)(b)	$\frac{19}{39}$
9(b)(ii)(c)	$\frac{34}{39}$
10(a)	260 cm by 60 cm by 120 cm
10(b)(i)	2700π cm^2
10(b)(ii)	8100π cm^2
10(b)(iii)	83900 cm^2 (3 s.f.)
10(c)	3
10(d)	1 020 000 cm^3 (3 s.f.)