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2022 End of Year Examination

Secondary Two Express

MATHEMATICS

Paper 1

Name: ____

10 Oct 2022 1 hour 15 minutes 0800h - 0915h

Class:

)

READ THESE INSTRUCTIONS FIRST

Write your full name, class and index number on all 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, 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.

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 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 50.

FOR	MARKER'S	USE
	Marks Awarded	Max Marks
Total		50

This question paper consists of 13 printed pages including the cover page.

Setter: Mrs Irving Long

Mathematical Formulae

Mensuration

Curved Surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone =
$$\frac{1}{3}\pi r^2 h$$



Answer all questions.

1 Solve the following simultaneous equations.

$$x - 2y = 13$$
$$2x + y = 6$$

Answer
$$x = \dots$$

y =[3]

2 workers can paint a school in 9 days.
6 workers are employed to paint the school.
After working for two days, 2 of the workers are ill and the rest of the workers continue to paint the school.

(a) Find the total number of days taken to paint the school.

Answer[3]

(b) State one assumption that we make for (a).

Answer[1]

3 Expand (x-2)(3-x).

DANYAL Factorise the following expressions completely. 4 (a) 25-15y.





(c) 2ax - 3ay - 4bx + 6by.

DANYI DANYAL Answer

5 Given that p + 2q = -2 and pq = -18, find the value of $(p - 2q)^2$.

6 In the diagram, AC and BD represent two ladders leaning against a vertical wall ABE.

CDE represents the horizontal ground.

Triangles ACE and BDE are similar.

Given that B is 1.6 m above the ground, what is the length of AB?







Answerm [3]

7 Simplify the following expressions.

(a)
$$\frac{7}{x-3} - \frac{3}{3-x}$$
.

(b)

(c)

$$Answer \dots [2]$$

$$Answer \dots [2]$$

$$Answer \dots [1]$$

$$Answer \dots [1]$$

$$\frac{16x^2 - 9}{4x^2 - 9x - 9}$$

$$Answer \dots [3]$$

8 Solve
$$\frac{4+a}{5} = \frac{a-2}{3}$$
.

9 Given that $c = \frac{8b+3}{b+1}$, make *b* the subject of formulae.





10 Triangle *ABC* and Triangle *GEF* are congruent.

It is given that AC = 11 cm, BC = 6 cm, angle $FEG = 89^{\circ}$ and angle $BAC = 33^{\circ}$.



(a) State the corresponding angle of $\angle BAC$.

DANYAL



(b) Find the length of FG.



(c) Find angle EFG.

Answer° [1]

- 11 The scale of map A is 1 : 200 000. The scale of map B is 1 : 50 000.
 - (a) The distance between two parks on map A is 4 cm.Find the distance between the two parks in centimetres on map B.

(b) A school is represented by a rectangle of sides 5cm by 10 cm on map B.Find the area of the school on map A in cm².





12 A sector *AOB* of radius 10 cm and arc length of 12π cm is folded into a cone of base radius *r* cm such that *OA* just meet *OB*.



(a) Show that the base radius of the cone, r, is 6 cm.

(b) Find the curved surface area of the cone.



- 13 Mary has three 10-cent coins, six 20-cent coins, one 50-cent coin and 5 \$1 coins in her pocket.
 - (a) Find the probability that a coin chosen at random is worth \$1.

Leave your answer as a fraction in its lowest term.

DANYAL

(b) Some of the 20-cent coins are removed.

The probability of picking a 20-cent coin from the remaining coins in Mary's pocket

is now $\frac{4}{13}$.

Find the number of coins that were removed.



End of Paper



2022 End of Year Examination

Secondary Two Express

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MATHEMATICS

Paper 2

Name: ____

13 Oct 2022 1 hour 15 minutes 0800h – 0915h

) Class:

READ THESE INSTRUCTIONS FIRST

Write your full name, class and index number on all work you hand in. Write in dark blue or black pen. You may use a pencil for any diagrams or graphs.

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Answer all questions.

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POR	MARAER S	USE
	Marks	Max
	Awarded	Marks
Total		50

This question paper consists of 12 printed pages including the cover page.

Setter: Ms Diyanah

Mathematical Formulae

Mensuration

Curved Surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone = $\frac{1}{3}\pi r^2 h$







Answer all the questions.

1 Simplify
$$\frac{2d+6}{8d^2-72}$$

		Answer		[2]
2	Express $\frac{1}{4a^2b} - \frac{1}{12ab^3}$ in its simplest form.	đ	DANYAL EDUCATION	
3	Find the smallest integer x that satisfies the inequality	Answery $\frac{7}{2}(x+3) > 1$	3 <i>x</i> + 4 .	[2]

4 The table below shows the number of hours a group of students spent surfing the internet in a day.

No. of hours	0	1	2	3	4
No. of students	2	3	4	x	0

(a) If the mode is 2, write down the largest possible value of x.

 Answer ______[1]

 (b) If the median is 2, write down the smallest possible value of x.

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- 5 The force of attraction, *F* newtons, between two magnets is inversely proportional to the square of the distance, *x* cm, between them. When the magnets are 10 cm apart, the force is 5 newtons.
 - (a) Write down a formula connecting F and x.

DANYAL

Answer [2]

(b) Find the force of attraction when the magnets are 2.2 cm apart.

Answer _____ Newtons [1]



8 The figure shows two triangles joined together. Given that *ABY* is a straight line, AB = 6 cm, BC = 8 cm, AC = 10 cm and XY = 7 cm.



(a) Show that $\triangle ABC$ is a right-angled triangle.

Answer [1]

(b) Express $\tan \angle CAB$ as a fraction.

(c) If $\sin \angle XYB = \frac{3}{4}$, find the length of XC.

DANYA [1] Answer_

Answer _____ cm [2]



The diagram shows the cross-section of a hemispherical bowl of radius 20 cm. Water is poured into the bowl to a depth of 7 cm.

Find the area of the surface of the water.

9

Answer _____ cm² [3]

10 A rectangular photo frame has a dimension of 37 cm by 26 cm. The frame has a border with uniform thickness of x cm, such that the photo within the frame has an area of 726 cm^2 .



(c)

Solve the equation $2x^2 - 63x + 118 = 0$ to find the thickness of the border.

Answer x = [2]

11 The test marks of 20 Secondary Two students in a class are shown in the table and stemand-leaf diagram below.

The passing mark for this test is 50.

46	56	86	50	56
76	68	66	72	74
69	74	42	73	76
64	86	40	48	70

Stem	Leaf
4	0 2 6 8
5	0 6 6
6	a 6 8 9
7	0 2 3 4 4 6 6
8	6 6

Key: 4|0 represents 40 marks

(a) Find the value of a.

Answer a = [1]

(b) Find the fraction of students who obtained more than 65 marks.

Answer [1]

(c) If 180 Secondary Two students test scores are to be recorded, is it suitable to represent the data using a stem-and-leaf diagram? Explain you answer.

Answer	
	1 AL
. 1.	

(d) Given that 40% of the students did not qualify to take Additional Mathematics (AM) in the following year, find the least score needed for a student to qualify to take AM.

Answer _____ marks [2]

[1]

(e) Based on the test results, Jenny said that the test is easy. Do you agree? Justify your answer.

Answer _____

[1]

12 The diagram shows a solid made from a cone and a hemisphere.



(a) Show that the height, h, of the cone is 12 cm.



(b) Calculate the volume of the solid.

		Answer	cm ³ [2]
(c)	Calculate the total surface area of the solid.		

Answer _____ cm² [3]

Complete the table of values for $y = -x^2 + 6x - 3$. 13 (a) [1] 0 2 3 1 4 5 x 6 2 5 5 2 - 3 y Draw the graph of $y = -x^2 + 6x - 3$ on the axis below. **(b)** [2] 7 6 5 4 3 2 1 ► x 0 -1 -2 -3

(c) Use your graph to find (i) the values of x when y = 3,

Answer x =_____ or x =_____ [2]

PartnerInLearning 163 (ii) the equation of line of symmetry,

Answer [1]

(iii) the y-intercept.

Answer [1]





End of paper

2022 EOY Sec 2E EM P1 Answers

Qns	Suggested Solution	
1	y = -4, x = 5	
2a	3.5 days	
b	The workers work at the same rate.	
3	$-x^2+5x-6$	
4a	25 - 15y = 5(5 - 3y)	
b	2(x-3)(x+1)	
С	(2x-3y)(a-2b)	
5	$\left(p-2q\right)^2=148$	
6	AB = 2.4 m	
7a	10	. 5 .
	x -3	LAL
b	2 h	TION
DP	y ATION EDUC	
CE	4x - 3	
	$\overline{x-3}$	
8	a = 11	
9	c - 3	
	$D = \frac{1}{8-c}$	
10a	EGF	
b	11 cm	
С	58°	
11a	16 cm	
b	3.125 cm ²	
12a	6	
b	188 cm ²	
13a	$\frac{5}{-1} = \frac{1}{-1}$	
<u> </u>	15 3	
b	x=2	NON TA
14a		UCALL
0	-0 2010. E	
C		
	7x + 6y + 48 = 0	
d	x = -5, y = -2	

Qn	Solution	Marks	Remarks
1	2d + 6		
	$8d^2 - 72$		
	$= \frac{2(d+3)}{2(d+3)}$	M1	
	= 8(d-3)(d+3)	IVI I	
	= 1		
	4(d-3)	A1	
2	$\frac{1}{1+2} - \frac{1}{1+2}$		
	$4a^2b$ 12 ab^3		1
	$=\frac{3b^2}{a}-\frac{a}{a^2}$	M1	AL
. 7	$12a^{2}b^{3}$ $12a^{2}b^{3}$	DAM	TION
DAY	$=\frac{3b^2-a}{12c^2b^3}$	ALDUC	
3 201	7 21	M1	
U	$\frac{7}{2}x + \frac{21}{2} > 3x + 4$ OR $7(x+3) > 6x + 8$	1411	
	$\frac{1}{1}$ $\frac{13}{7r+21}$ $\frac{5r+8}{7r+21}$		
	$\frac{1}{2}x = \frac{1}{2}$		
	x > -13 $x > -13$	M1	
	∴ x = -12	A1	
4(-)	and the second	D1	
4(a)	5 EDUCAL	BI	
4(b)	2	B1	
5(a)	k		
	$5 = \frac{10^2}{10^2}$		
	k = 500	M1	NAL
	500	AI DP	TION
DA	$\therefore F = \frac{1}{x^2}$	AI	JOC.
5(b)	$F = \frac{500}{1000}$		
5	$\frac{1}{2.2^2}$	D1	
- 0 - 2 i	= 103 Newtons	BI	
6(a)	$\frac{(0\times1) + (6\times2) + (7\times3) + (8\times5) + (9\times3) + (10\times2)}{10} = 7.5$	BI	
(0)	16	P 1	
0(D)	0 marks, hence causing the mean to be much smaller.	DI	
7(a)	$\sqrt{55^2 - 30^2}$	M1	
	= 46.0977		
	We share the second of 200 d 2		

MARKING SCHEME 2E MATHS PAPER 2 2022

Canberra Secondary School 2022 End of Year Examination

≈ 46.1m

A1

7(1-)	20	MI
/(D)	$\sin x = \frac{30}{55}$	
	22 0557	
	x = 33.0557	A1
	= 33.1°	
8(a)	AC^2 $AB^2 + BC^2$	
	$=10^2$ $=6^2+8^2$	
	=100 =100	
	Since $AC^2 = AB^2 + BC^2$, by converse of Pythagoras	B1
0(1)	Theorem, ΔABC is a right-angled triangle.	
8(D)	$\frac{8}{6} = \frac{4}{2}$	B1
9(0)		
0(1)	$XB = \frac{7}{4} \times 3$	NYLON
nA	= 5.25 cm	MI
Dr.	CAL 0.25 CH	EDU
EI	XC = 8 - 5.25	
	$= 2.75 \mathrm{cm}$	A1
	Students may also use this method:	
	$\angle XYB = \sin^{-1}\left(\frac{3}{2}\right)$	
	(4)	
	= 48.5903°	
	$\sin 48.5903 = \frac{XB}{ED}$	
	7	2.61
	<i>XB</i> = 5.2499	MI
	<i>XC</i> = 8 - 5.2499	1
	= 2.7501	NYAL
	≈ 2.75 cm	A1 DECATION
9 0	A CONTRACTOR	EDUC
1	20 cm	
	× × · · · ·	
	7 cm	
	<u> </u>	

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	v = 20 7		
	y = 20 - 7	M1	
	y = 13 cm	MI	
	$x^2 + 13^2 = 20^2$		
	$x^2 = 231$		
	\therefore area of the surface of water = πr^2		
	$= \pi(231)$	Al	
	$= 726 \text{ cm}^2$		
10(a)(i)	37 - 2x cm	B1	
10(a)(ii)	26 - 2x cm	B1	
10(b)	(37 - 2x)(26 - 2x) = 726	~	PP.
	$962 - 74x - 52x + 4x^2 = 726$	M1	TON
DA	$4r^2 - 126r + 236 = 0$	EDUC!	
EDI	$2x^2 - (2x + 118 - 0)$ (shown)	Al	
10(2)	2x - 63x + 118 = 0 (snown)	M1	
10(0)	(2x-39)(x-2) = 0	Al	No marks
	x = 29.5 (reject) of $x = 2$		awarded if students do not reject 29.5
11(a)	4 DAMPTION	B1	
11(b)	$\frac{12}{20} = \frac{3}{5}$ EDUC	B1	
11(c)	No, as the data will be too large. No, as the process will be too tedious.	B1	Any reasonable
	No, as it would be difficult to read and obtain data.		answers can be accepted.
11(d)	$\frac{60}{2} \times 20 = 12$	M1 DP	CATION
DP	100	A1 ET	000
ET	\therefore least score = 66 marks	711	
	OR		
	$\frac{40}{2} \times 20 = 8$ students not qualified	MI	
	100	1011	
	\therefore least score = 66 marks	A1	
11(e)	Yes, as more students passed the test.	B1	Any
	Yes, as there are only 4 failures.		reasonable
			be accepted.
12(a)	$h^2 = 15^2 - 9^2$		
	$h = 12 \mathrm{cm}$ (shown)	B1	
		1	

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12(b)	Volume of cone = $\frac{1}{3} \times \pi \times 9^2 \times 12$		
	$= 1017.876 \mathrm{cm}^3$	M1	
	Volume of hemisphere = $\frac{1}{2} \times \frac{4}{3} \times \pi \times 9^3$		
	$= 1526.814 \text{ cm}^3$	M1	
	Total volume = $1017.876 + 1526.814$		
	= 2544.69	4.1	
12(c)	$\approx 2540 \text{ cm}^3$	AI M1	
12(0)	$\left(\pi \times 9 \times 15\right) + \left(\frac{1}{2} \times 4 \times \pi \times 9^{2}\right)$	NI I	
	= 933.053		AL
	$\approx 933 \text{ cm}^2$	Al	TON
13(a)	-3,60	BIEDUC	
13(b)	6	G1 – correct plotting G1 – smooth	
	-2 DANYAL EDuchion		VAL
D	ANTAN P	D	DUCATION
13(c)(i)	1.27 or 4.73 (±0.1)	B1, B1	
13(c)(ii)	<i>x</i> = 3	B1	

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		e	

13(c)(iii)	-3	B1	





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