ST. MARGARET'S SECONDARY SCHOOL.

Mid-Year Examinations 2017

CANDIDATE NAME

CLASS

REGISTER NUMBER

MATHEMATICS

Section A

Secondary 2 Express

11 May 2017

2 hours 30 minutes

(For Sections A and B)

Additional Materials: NIL

READ THESE INSTRUCTIONS FIRST

Write your name, registration number and class on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A contains **14** questions.
Answer all the questions in the spaces provided.
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.
You are advised to spend no more than 1 hour 15 minutes on this section.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this section is 50.

For Examiner's Use

This document consists of **14** printed pages and a blank page

3

Section A

Answer **all** questions

1   **(a)**   Convert 5.25 % to a fraction in its simplest form.

Answer (a) _____ [1]

(b)   An apartment costs 40% more today than when it was built. If the cost of the apartment was \$410 550 when it was built, find its cost today.

Answer (b)   \$_____ [2]

2   If $a : b = 5 : 6, b : c = 7 : 12$, find $a : b : c$.

Answer _____:_____:_____ [2]

4

3 (a) Express 3528 as a product of prime factors, leaving your answer in index notation.

Answer (a) _____ [2]

(b) Explain why 3528 is not a perfect cube.

Answer (b) _____

_____

_____ [1]

(c) **Hence, find the smallest positive integer n such that $3528n$ is a perfect cube.**

Answer (c) _____ [1]

[Turn over

4 **(a)** Write the following numbers, correct to **three** significant figures.

    (i) 299.678

Answer (a)(i) _____ [1]

    (ii) 902.997

Answer (a)(ii) _____ [1]

(b) **Hence,** estimate the value of $\dfrac{902.997 \times 100}{299.678}$, correct to 2 significant figures.

Answer (b) _____ [2]

5 **(a)** Expand $(x - y)^2$.

Answer (a) _____ [1]

(b) **Hence**, without using a calculator, evaluate 698^2.

Answer (b) _____ [2]

6 Express the following as a single fraction in its simplest form.

(a) $\dfrac{3a+2}{5} - \dfrac{5-9a}{7}$

Answer (a) _____ [2]

(b) $\dfrac{x^2 + 3x + 2}{x^2 - 4x - 12}$

Answer (b) _____ [2]

[Turn over

7 Solve the following pair of simultaneous equations.

$$-y + \frac{1}{2}x = -3$$
$$7y - 6x = 11$$

Answer $x =$ _____

$y =$ _____ [3]

[Turn over

8 It is given that T is directly proportional to $\sqrt{l}$. The table below shows some values of T and l.

T	3	12
l	36	n

(a) Find an equation connecting T and l.

Answer (a) _____ [2]

(b) **Hence**, using the table above and your answer to (a), find the value of n.

Answer (b) $n =$ _____ [1]

(c) Find the value of T given that $l = 289$.

Answer (c) $T =$ _____ [1]

[Turn over

9   Shirley has 16 bananas, 48 guavas and 72 oranges. She wishes to pack an equal number of each type of fruit into smaller packets.

(a)   What was the maximum number of packets that she could pack?

Answer (a) _____ [2]

(b)   How many of each type of fruit was there in each packet?

Answer (b) _____ bananas

_____ guavas

_____ oranges [1]

11

10 Expand and simplify the following expressions.

(a) $3(5x+6y)+4(3-2y)$

Answer (a) _____ [2]

(b) $(3a-1)(a+5)+2a-4$

Answer (b) _____ [2]

(c) $\left(n-\dfrac{4}{n}\right)^2 +8$

Answer (c) _____ [2]

12

11 **(a)** Solve $6x^2 + 7x - 20 = 0$.

Answer (a) $x =$ _____ , _____   [2]

(b) **Hence**, find the values of y given $6(y-2)^2 + 7(y-2) - 20 = 0$.

Answer (b) $y =$ _____ , _____   [2]

12 Factorise $x^3 - x^2 - xy^2 + y^2$ completely.

Answer   _____   [2]

13 In the diagram, *ABDE* is a trapezium and *CDEF* is a parallelogram. Given that
$BC = CF$ and $\angle CDE = 108°$, **stating with reasons**, find
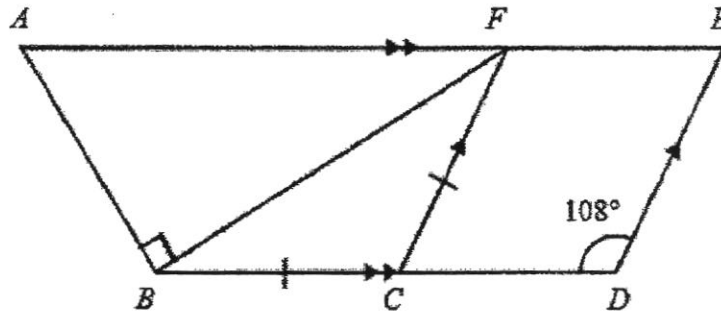
(a) $\angle CBF$,

Answer (a) _____° [2]

(b) $\angle BFE$,
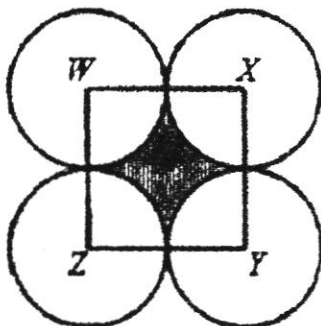
Answer (b) _____° [1]

(c) $\angle BAF$.

Answer (c) _____° [1]

14 The figure shows a company logo which consists of 4 identical circles with centres W, X, Y and Z and a shaded central portion. The centre of each circle is joined to form the square $WXYZ$.

If the radius of each circle is 4 cm, find, **in terms of** π,

(a) the perimeter of the shaded region,

Answer (a) _____ cm   [2]

(b) the area of the shaded region.

Answer (b) _____ cm^2 [2]

MYE 2017 Math Section A Answer Key

Qn No.	Answer	Marks Allocated	Remarks
1	a) $\frac{21}{400}$	1	
	b) $574\ 770	2	
2	$35:42:72$	2	
3	a) $2^3 \times 3^2 \times 7^2$	2	
	b) The power / index of the bases 3 and 7 are not multiples of 3.	1	
	OR		
	The cube root of 3528 does not yield a whole number.		
	c) 21	1	
4	a)(i) 300	1	
	a)(ii) 903	1	
	b) 300	2	
5	a) $x^2 - 2xy + y^2$	1	
	b) $487\ 204$	2	
6	a) $\frac{66a-11}{35}$ **OR** $\frac{11(6a-1)}{35}$	2	
	b) $\frac{x+1}{x-6}$	2	
7	$x=4, y=5$	3	
8	a) $T = \frac{1}{2}\sqrt{l}$	2	
	b) 576	1	
	c) 8.5	1	
9	a) 8	2	
	b) 2 bananas, 6 guavas & 9 oranges	1	
10	a) $15x + 10y + 12$	2	
	b) $3a^2 + 16a - 9$	2	
	c) $n^2 + \frac{16}{n^2}$	2	
11	a) $x = 1\frac{1}{3}$ **OR** $x = -2\frac{1}{2}$	2	
	b) $y = 3\frac{1}{3}$ **OR** $y = -\frac{1}{2}$	2	

Qn No.	Answer	Marks Allocated	Remarks
12	$(x-1)(x-y^2)$	2	
13	a) $36°$	2	
	b) $144°$	1	
	c) $54°$	1	
14	a) 8π cm	2	
	b) $(64-16\pi)$ cm^2 OR $16(4-\pi)$ cm^2	2	

ST. MARGARET'S SECONDARY SCHOOL

Mid-Year Examinations 2017

CANDIDAT E NAME

CLASS

REGISTER NUMBER

MATHEMATICS

Section B

Secondary 2 Express

11 May 2017

2 hours 30 minutes

(For Sections A and B)

Additional Materials: Writing Paper, Graph Paper

READ THESE INSTRUCTIONS FIRST
Write your name, registration number and class on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section B contains **10** 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.
You are advised to spend no more than 1 hour 15 minutes on this section.

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 section is 50.

For Examiner's Use

This document consists of **4** printed pages

Answer all the questions.

1   Solve the inequality $3n - 7 \geq -4$.
    Hence write down the smallest possible value of n given that it is a prime number.   [2]

2   (a)   Simplify $(2a+3)^2 - (a+7)^2$.   [2]

    (b)   Given that $(x-y)^2 = 25$ and $x^2 + y^2 = 9$, find the value of xy.   [2]

3   Two quantities, x and $\sqrt{y+1}$, are inversely proportional. When $x = 10$, $y = 35$.

    (a)   Find an equation connecting x and y.   [2]

    (b)   Hence find the value of y when $x = 20$.   [2]

4   Town A and Town B are 240 km apart. A car is travelling at 90 km/h while a motorcycle
    is travelling at 1000 m/min. Given that both vehicles leave Town A at 8 a.m., which vehicle
    will reach Town B first? At what time would it reach?   [4]

5   The sum of interior angles of a regular n-sided polygon is 1260°.
    Two of the interior angles are 38° and 151°, and the remaining angles are $x°$ each.
    Find the value of x.   [4]

6   Three ferry services A, B and C leave the jetty at intervals of 8 minutes, 12 minutes and
    15 minutes respectively.
    If the ferries first leave together at 10.15 a.m., when will they next leave together again?   [3]

7   (a)   Joycelyn buys 4 identical tins of paint to paint her room at a total cost of $90.60.
          How much would it cost her if she buys 7 identical tins of paint?   [2]

    (b)   Joycelyn and her sister would take 8 hours to paint a room if they work together.
          Joycelyn decides to ask three of her friends to help.
          Assuming all five of them work at the same rate, how many hours would it take for
          them to finish painting the room?   [2]

8   The diagram below shows a rectangle $ABCD$. $AB = (2x+5)$ cm, $BC = (x-7)$ cm.
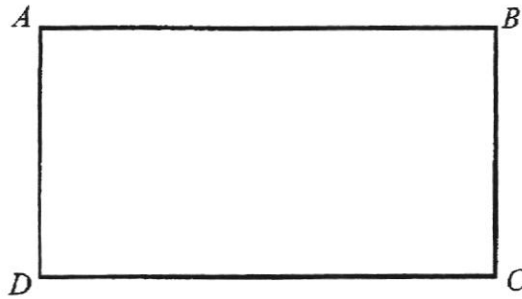
(a)   Given that the area of the rectangle is 91 cm², form an equation in x and show that it reduces to $2x^2 - 9x - 126 = 0$.   [2]

(b)   Solve the equation in (a) and find the perimeter of rectangle $ABCD$.   [4]

9   The table below shows the admission rates to the Conservatories at Gardens by The Bay.

Local Resident Rates

Description	Price
Flower Dome + Cloud Forest (Adult)	$20.00
Flower Dome + Cloud Forest (Child)	$12.00
Flower Dome + Cloud Forest (Senior Citizen)	$15.00
Flower Dome or Cloud Forest (Adult)	$12.00
Flower Dome or Cloud Forest (Child)	$8.00
Flower Dome or Cloud Forest (Senior Citizen)	$8.00

All prices are inclusive of GST.

Terms and Conditions:
Child is defined as 3 to 12 years old. Free admission for children below 3 years old. Senior Citizen is defined as 60 years and above. Adult is defined as 13 years old and above.

(a)   During the March School Holidays, Mr Lee decided to bring his wife, 61 year-old mother and three children to the Flower Dome and Cloud Forest. His children are 9, 12 and 14 years in age. How much did Mr Lee have to pay in total?   [2]

(b)   PAssion card holders enjoy a 15% off the local resident conservatories tickets, with a maximum of 4 tickets per card transaction.

OCBC credit card members enjoy 10% off the local resident conservatories tickets.

Kevin and his four friends, all being 21 years old, bought tickets to the two conservatories. Kevin owns a PAssion card and an OCBC credit card. Which card should Kevin use to pay for the tickets?   [3]

(c)   A local tour agent is planning a tour to the two conservatories over the weekend.

(i)   On Saturday, x adults and y children joined the tour. The total admission fees is $272. Form an equation in x and y.   [1]

(ii)   On Sunday, $1.5x$ adults and $0.5y$ children joined the tour to visit only one of the conservatories. The total admission fees is $204. Form an equation in x and y.   [1]

(iii)   Solve the two equations to find the number of adults and children who joined the tour on Sunday.   [4]

4

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

10 The variables x and y are connected by the equation $y = x^2 + 2x - 8$.
    The table gives some corresponding values of x and y.

x	-3	-2	0	1	2	3
y	-5	a	-8	b	0	7

(a) Find the values of a and b. [2]

(b) Using a scale of 2 cm to 1 unit on the x-axis and 1 cm to 1 unit on the y-axis, draw the graph of $y = x^2 + 2x - 8$ for $-3 \le x \le 3$. [3]

(c) Write down the line of symmetry. [1]

(d) Using your graph,

   (i) find the value of y when $x \approx 1.5$, [1]

   (ii) solve the equation $x^2 + 2x - 8 = 0$. [1]

~ End of paper ~

Mid Year Examinations
Sec 2 Express
Section B

S/N	Answer	Remarks
1	$n \geq 1$ Smallest possible value of $n = 2$	
2	a) $3a^2 - 2a - 40$ b) $xy = -8$	
3	a) $\sqrt{y+1} = \dfrac{60}{x}$ or $x = \dfrac{60}{\sqrt{y+1}}$ b) $y = 8$	
4	The car will reach Town B first at 10.40 am.	
5	$x = 153$	
6	The ferries will next leave together at 12.15 pm.	
7	a) \$158.55 b) 3.2 h or 3 h 12 min or $3\frac{1}{5}$ h	
8	b) 59 cm	
9	a) \$99 b) Passion card c) i) $20x + 12y = 272$ or $5x + 3y = 68$ ii) $18x + 4y = 204$ or $9x + 2y = 102$ iii) 15 adults and 3 children	