Name	Reg. No	Class

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1EX

MATHEMATICS	SEMESTER ONE EXAMINATION
[80 marks]	Tuesday 12 MAY 2015
	2 hours

Additional materials: Electronic calculator
A4 Writing papers (3 sheets)

For Examiner's Use	
Section A **Subtotal**	
Section B **Subtotal**	
Total:	

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, register number and class 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 in **both Sections A and B**.
Omission of essential working will result in loss of marks.

For Section A [40 Marks]

Write your answers in the spaces provided on the question paper.
If working is needed for any question, it must be shown in the space below that question.
Write the brand and model of your calculator in the space provided below.

For Section B [40 Marks]

Write your answers in the spaces on the separate A4 writing papers provided.

Submit both question booklet and Section B answer script separately.

INFORMATION FOR CANDIDATES

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, the answer should be given 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 of the marks for this paper is **80**.

Brand / Model of Calculator

This question paper consists of **10** printed pages.

Setter: Mdm Chelsea Yam   Vetter: Mr. Chio Kah Leong

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1 Using your calculator, evaluate the following.

(a) $\dfrac{\left(-3\frac{7}{12}\right)\times\left(\frac{2}{5}\right)^3}{2\frac{1}{10}-1\frac{3}{4}}$, giving your answer correct to 3 decimal places.

(b) $\sqrt[3]{824}\times\sqrt{911}+\pi-20.56$, giving your answer correct to 3 significant figures.

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

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

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2 When $p=\frac{1}{2}, q=-3$ and $r=1$, evaluate the following expressions.

(a) $\frac{1}{4}r(pr-qp)$,

(b) $\dfrac{p-qr^2}{pqr}$.

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

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

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3 **(a)** Express 578.09 correct to 2 significant figures.

(b) Express $\frac{7}{11}$ as recurring decimals.

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

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

4 Express the following word statements algebraically.

(a) Subtract 5 from the product of m and n.

(b) Divide the sum of $3t$ and $4v$ by u.

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

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

5 **(a)** Written as a product of its prime factors,

$$1584 = 2^x \times 3^y \times 11.$$

Find the values of x and y.

(b) Written as a product of its prime factors,

$$1350 = 2 \times 3^3 \times 5^2.$$

Find the smallest positive integer k such that $\frac{1350}{k}$ is a square number.

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

$y =$ .....[1]

Answer (b) $k =$ .....[1]

For Examiner's Use

6 Given the expression $4x^2 - 3x - 7y + 2xy + 1$, state

(a) the number of terms in the expression,

(b) the coefficient of x,

(c) the constant term.

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

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

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

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7 **(a)** Find the sum of $8h + 4k - 3$ and $12h - 10k + 1$.

(b) Subtract $4x - 18y + z$ from $9x - 6y - 2z$.

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

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

For Examiner's Use

8 Expand and simplify the following

(a) $-3(3a - b) + 2(a + b)$,

(b) $2a(16a + 4b) - (-4a)^2$.

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

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

9 Simplify the following

(a) $1 - \frac{5 - 6x}{4}$,

(b) $\frac{4(2x + 1)}{3} + \frac{x - 3}{6}$.

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

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

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For Examiner's Use

10 Factorise the following completely

(a) $21f - 7fg + 49gf$,

(b) $5y(2a + b) - 20(2a + b)$.

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

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

11 Solve the following equations

(a) $3x - 1 = 5$,

(b) $\frac{1}{7}x - 1 = 3 - 4x$.

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

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

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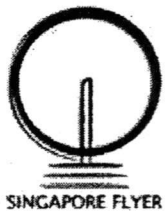
12 The Singapore Flyer is a giant observation wheel with seating capacity of 784 passengers. The number of passengers that each capsule can carry is equal to the total number of capsules on the Singapore Flyer.



(a) Find the prime factorisation of 784 and express your answer in index notation.

(b) Hence, find the total number of capsules on the Singapore Flyer.

Answer ..... [2]

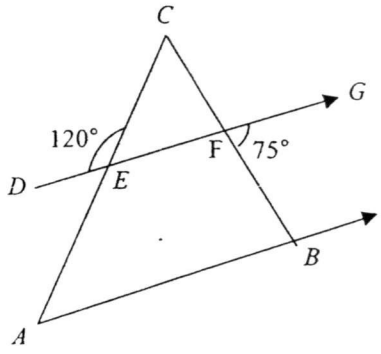
Answer..... [1]

13 In the following diagram (not drawn to scale), ABC is a triangle and AB is parallel to $DEFG$. $\angle DEC = 120°$ and $\angle BFG = 75°$. Stating your reasons clearly in your workings, find

(a) $\angle AEG$,

(b) $\angle ABC$, and

(c) $\angle CAB$.



Answer(a) $\angle AEG =$..... [1]

Answer(b) $\angle ABC =$..... [1]

Answer(c) $\angle CAB =$..... [1]

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Section B

Answer all the questions on the foolscap papers provided.

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14 Indicate if the following statements are true or false and give your reason(s).

(a) 2 is a prime number. [1]

(b) -1 is a perfect square and not a perfect cube. [1]

(c) $\sqrt{9}$ is an irrational number. [1]

15 Blessed Organisation plans to donate 440 packs of biscuits, 320 can food and 200 kg of rice to the old folks' home. The maximum number of packs of biscuits, can food and rice are to be placed equally in gift bags before the donation.

(a) How many gift bags are needed? [2]

(b) How many of each items are there in each gift bag? [1]

16 The main gate of Singapore Istana is monitored by three security cameras. The first camera scans the gate every 30 seconds, the second camera scans every 24 seconds and the third camera scans every 50 seconds. The three cameras scan the main gate together at 6am.

At what time will they scan the main gate together again? [3]

17 **(a)** The melting point of mercury is $-39°C$ and the freezing point of alcohol is $-114°C$. How much warmer is the melting point of mercury than the freezing point of alcohol? [2]

(b) Fish Mart invested $\frac{1}{4}$ of its revenue on research and $\frac{2}{5}$ on training workers and the remaining on infrastructure of the farm.

(i) What is the fraction of the revenue Fish Mart has spent on its infrastructure? [1]

(ii) Find the total revenue if Fish Mart invested \$30,000 more on training workers than on research. [2]

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18 Brannon has some tokens in blue and red. The number of red tokens is 6 less than 5 times the number of blue tokens. Let x represents the number of blue tokens.

(a) Find the expression for the number of red tokens Brannon has. [1]

(b) If he has a total of 12 tokens, form an equation in x and solve it. [2]

(c) Hence find the number of red tokens. [1]

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19 There are 3 consecutive **odd** integers. Let $n-1$ be the smallest integer.

(a) Write down expressions for the next two bigger consecutive odd integers after $n-1$. [2]

(b) Find, in its simplest form, the expression for the sum of these three consecutive odd integers. [1]

(c) If the sum is 159, find the value of n. [1]

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20 A wooden block has a mass of 55 grams, correct to the nearest gram.

(a) Find the least possible mass of the wooden block. [1]

(b) The volume of the wooden block is 19 cm^3, correct to the nearest cubic centimeter. Find the greatest possible mass of 1 cubic centimeter of the wood. [2]

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21 **(a)** Simplify $4(2xy - 1) - 6x(4y + 3) + (2 - 2x)$ and give the answer in factorised form. [2]

(b) Solve the following equations

(i) $5(x + 2) = 3(2x - 3)$, [2]

(ii) $\frac{2x}{5} + \frac{3(x-4)}{2} = 13$. [2]

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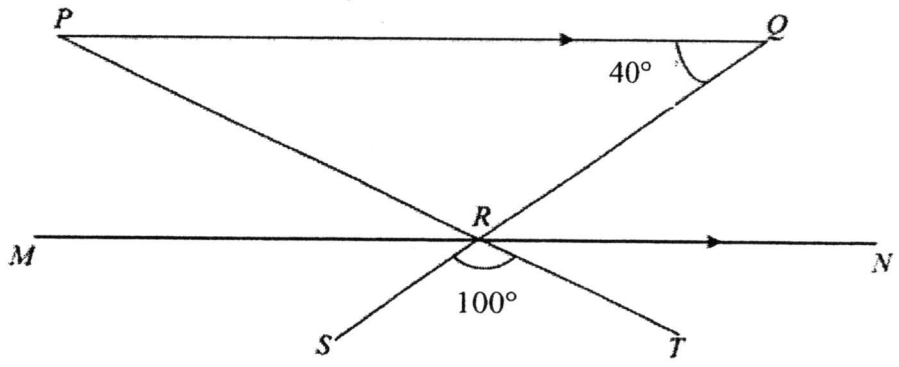
22 In the diagram, MRN, SRQ, PRT are straight lines and MN is parallel to PQ. $\angle PQR = 40°$ and $\angle SRT = 100°$.



Find

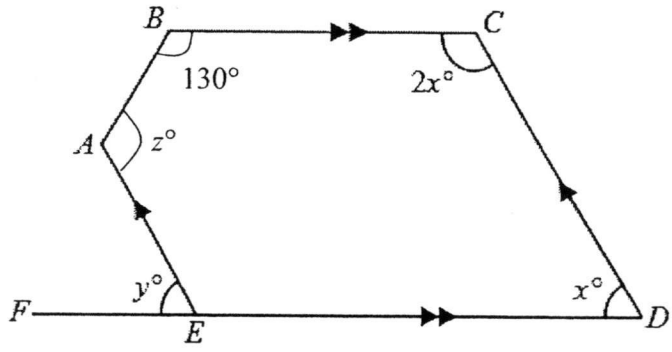
(a) $\angle MRS$, and [2]

(b) $\angle RPQ$. [2]

State your reasons clearly in your workings.

For Examiner's Use

23 In the figure below, BC is parallel to DF and AE is parallel to CD.
Given that $\angle BCD = 2x°$, $\angle CDE = x°$, $\angle AEF = y°$ and $\angle ABC = 130°$.



Find the value of

(a) $\angle x$, [2]

(b) $\angle y$, and [1]

(c) $\angle z$. [2]

State your reasons clearly in your workings.

- End of Paper -

Answer Scheme for **ONE EXPRESS 2015** Semester One Examination

No	Answer	Marks
1a	-0.655 ----- -B1	1
1b	266 ------B1	1
2a	$\frac{1}{4}(1)[\frac{1}{2}(1)-(-3)(\frac{1}{2})]=\frac{1}{4}(2)$ ----- M1 $=\frac{1}{2}$ ----- A1	2
2b	$\frac{\frac{1}{2}-(-3)(1)^2}{(\frac{1}{2})(-3)(1)}=\frac{3\frac{1}{2}}{(-\frac{3}{2})}$ ----- M1 $=-2\frac{1}{3}$ ----- A1	2
3a	580 ------B1	1
3b	$0.\dot{6}\dot{3}$ ------B1	1
4a	$mn-5$ ------B1	1
4b	$\frac{3t+4v}{u}$ ------B1	1
5a	$1584=2^4\times3^2\times11.$ $x=4$ ------B1 $y=2$ ------B1	2
5b	$k=2\times3=6$ ------B1	1
6a	5 ------B1	1
6b	-3 ------B1	1
6c	1 ------B1	1
7a	$8h+4k-3+12h-10k+1$ $=20h-6k-2$ ------B1	1
7b	$9x-6y-2z-(4x-18y+z)$ $=9x-6y-2z-4x+18y-z$ ------M1 $=5x+12y-3z$ ------A1	2
8a	$-3(3a-b)+2(a+b)$ $=-9a+3b+2a+2b$ ------M1 $=-7a+5b$ ------A1	2
8b	$2a(16a+4b)-(-4a)^2$ $=32a^2+8ab-16a^2$ ------M1 $=16a^2+8ab$ ------A1	2
9a	$1-\frac{5-6x}{4}$ $=\frac{4-5+6x}{4}$ ------M1 $=\frac{6x-1}{4}$ ------A1	2

9b	$\frac{4(2x+1)}{3}+\frac{x-3}{6}$ $=\frac{8(2x+1)+x-3}{6}$ $=\frac{16x+8+x-3}{6}$ ------M1 $=\frac{17x+5}{6}$ ------A1	2
10a	$21f-7fg+49gf$ $=21f+42fg$ ------M1 $=21f(1+2g)$ ------A1	2
10b	$5y(2a+b)-20(2a+b)$ $=(2a+b)(5y-20)$ ------M1 $=5(2a+b)(y-4)$ ------A1	2
11a	$3x-1=5$ $3x=6$ $x=2$ ------B1	1
11b	$\frac{1}{7}x-1=3-4x$ $\frac{1}{7}x+4x=4$ ------M1 $4\frac{1}{7}x=4$ $x=\frac{28}{29}$ ------A1	2
12a	2 | 784 2 | 392 2 | 196 2 | 98 7 | 49 7 | 7 1 ----- -M1 $784=2^4\times7^2$ ----- -A1	2
12b	$\sqrt{784}=\sqrt{2^4\times7^2}$ $=2^2\times7$ $=28$ ------B1	1
13a	$\angle AEG=120^o$ (vert. opp $\angle$s) ------B1	1
13b	$\angle ABC=75^o$ (alt $\angle$s, DG//AB) ------B1	1
13c	$\angle CAB=\angle CEF$ (corr $\angle$s, DG//AB) $=180^o-120^o$ $=60^o$ ------B1	1
	Section A: Total Marks	**40**
14a	**True**. 2 is divisible by 1 and itself, hence satisfy the definition for prime no. ------B1	1

14b	$(-1)^2 \neq -1$ $(-1)^3 = -1$ -1 is not a perfect square but it is a perfect cube. Hence the statement is **false**. ------B1	1
14c	$\sqrt{9} = 3$ $\sqrt{9}$ is a real number hence the statement is **false**. ------B1	1
15a	10 | 440 320 200 2 | 44 32 20 2 | 22 16 10 11 8 5 Number of gift bags needed $= 10 \times 2 \times 2$ ------M1 = 40 bags ------A1	2
15b	There are 11 packs of biscuits, 8 can food and 5 kg of rice in each gift packs. ------B1	1
16	2 | 30 24 50 3 | 15 12 25 5 | 5 4 25 1 4 5 LCM = $2 \times 3 \times 5 \times 1 \times 4 \times 5$ ------M1 = 600 seconds = 10mins ------M1 The time will be at 6.10am. ------A1	3
17a	$-39-(-114)$ ------M1 $= 75^{\circ}C$ ------A1	2
17b(i)	$1-\frac{1}{4}-\frac{2}{5}=\frac{7}{20}$ ------B1	1
17b(ii)	$\frac{2}{5}-\frac{1}{4}=\frac{3}{20}$ 3units → \$30,000 ------M1 20units → \$200,000 ------A1	2
18a)	$5x-6$ ------B1	1
18b)	$5x-6+x=12$ ------M1 $6x-6=12$ $x=3$ ------A1	2
18c)	$5(3)-6=9$ ------B1	1
19a	$n+1, n+3$ ------B2	2
19b	$n-1+n+1+n+3 = 3n+3$ ------B1	1

19c	$3n + 3 = 159$ $3n = 156$ $n = 52$ ------B1	1
20a	54.5 grams ------B1	1
20b	$\frac{55.4\dot{9}}{18.5}$ ------B1 $= 2.\dot{9}$ *grams* ------A1	2
21a	$4(2xy - 1) - 6x(4y + 3) + (2 - 2x)$ $= 8xy - 4 - 24xy - 18x + 2 - 2x$ ------M1 $= -16xy - 20x - 2$ $= -2(8xy + 10x + 1)$ ------A1	2
21b(i)	$5(x + 2) = 3(2x - 3)$ $5x + 10 = 6x - 9$ ------M1 $x = 19$ ------A1	2
21b(ii)	$\frac{2x}{5} + \frac{3(x-4)}{2} = 13$ $\frac{4x + 15x - 60}{10} = 13$ ------M1 $19x - 60 = 130$ $x = 10$ ------A1	2
22a	$\angle QRN = \angle PQR$ (alt $\angle s$, PQ//MN) $= 40^\circ$ ------M1 $\angle MRS = 40^\circ$ (vert. opp $\angle s$) ------A1	2
22b	$\angle PRM = 180^\circ - 100^\circ - 40^\circ$ (adj $\angle s$ on a str. line) $= 40^\circ$ ------M1 $\angle RPQ = \angle PRM$ (alt $\angle s$, PQ//MN) $= 40^\circ$ ------A1	2
23a	$2x + x = 180^\circ$ (sum of int $\angle s$) ------M1 $3x = 180^\circ$ $x = 60^\circ$ ------A1	2
23b	$\angle y = \angle x$ $= 60^\circ$ (corres $\angle s$,AE//CD) ------B1	1
23c	$\angle EAG = \angle AEF$ (alt AG//ED) $= 60^\circ$ ------M1 $\angle BAG = 180^\circ - 130^\circ$ (int $\angle s$) $= 50^\circ$ $\angle EAB = 60^\circ + 50^\circ$ $= 110^\circ$ ------A1	2
	Total marks	40