YUAN CHING SECONDARY SCHOOL
2015 MID YEAR EXAMINATION
SECONDARY TWO EXPRESS

MATHEMATICS
4048 / 01

NAME:_____( )

TIME: 1 hour

CLASS: Sec _____

READ THESE INSTRUCTIONS FIRST

Write your name, class and index 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 staple, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown in the space below that question.
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.

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 the marks for this paper is **40**.

40

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Answer **all** the questions.

1 V is directly proportional to the square root of p. Given that $V = 36$ when $p = 16$, find

(a) an equation connecting V and p,

(b) the value of V when $p = 0.04$,

(c) the value of p when $V = \frac{1}{3}$.

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

(b) $V =$ ..... [1]

(c) $p =$ ..... [1]

2 Expand and simplify the following.

(a) $(x + 2)(3x + 7)$,

(b) $6x^2 - x(1 - 2x)$.

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

(b) ..... [1]

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3 Factorise each of the following completely.

(a) $2x^2 + 9 + 9x$,

(b) $25x^2 - 100$,

(c) $x(y-1) + 1 - y$,

(d) $6mx - 3kx - 4ky + 8my$.

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

(b) ..... [2]

(c) ..... [2]

(d) ..... [2]

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4 **(a)** Given that $(x+y)^2 = 10$ and $x^2 + y^2 = 6$, find the value of xy.

(b) Evaluate the following using the special products of algebraic expressions.

(i) 99^2,

(ii) 103×97.

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

(bi) ..... [2]

(bii) ..... [2]

5 Express each of the following as a single fraction in its simplest form.

(a) $\frac{x}{2} + \frac{x-5}{3}$,

(b) $\frac{5}{x} - \frac{4}{x+2}$.

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

(b) ..... [2]

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6 Simplify the following.

(a) $\frac{5y}{10x} \times \frac{6x^2y}{3xy^3}$

(b) $\frac{x^2+2x}{2x^2+x-6}$

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

(b) ..... [2]

7 Given that $T = \sqrt{y - \frac{1}{2}x}$,

(a) express x in terms of y and T,

(b) hence, find the value of x when $y = 10.5$ and $T = \frac{2}{3}$.

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

(b) $w =$ ..... [1]

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8 It is given that $x = 4$ is a root of the equation $2x^2 - (k+1)x - 12 = 0$, where k is a constant. Find

(a) the value of k,

(b) the other root of the equation.

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

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

9 Using the elimination method, solve the pair of simultaneous equations

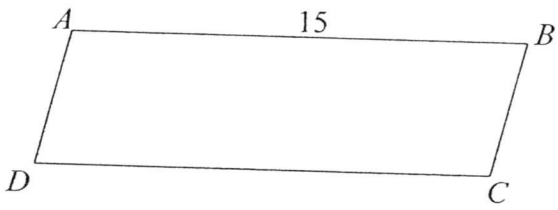
$$7x - 3y = 4,$$
$$3y + 5x = 2.$$

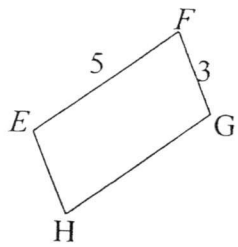
Answer $x =$ ....., $y =$ ..... [3]

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10 In the diagram, the parallelograms $ABCD$ and $EFGH$ are similar.
The dimensions given are in cm.
(a) Calculate the scale factor of enlargement/reduction,
(b) find the length of BC.
(The figures are not drawn to scale)

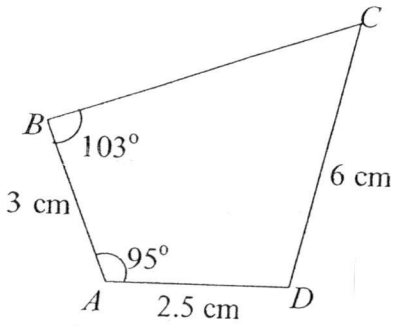


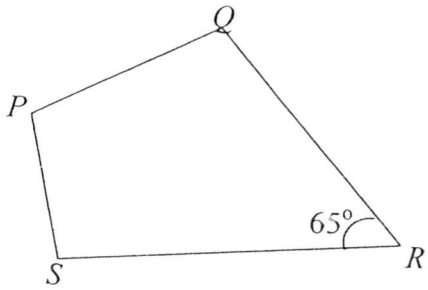


Answer (a) ..... [1]

(b) BC = ... cm [1]

11 Given that $ABCD$ is congruent to $PSRQ$, find
(a) the length of PS,
(b) $\angle PQR$.
(The figures are not drawn to scale.)





Answer (a) PS =.....cm [1]

(b) $\angle PQR$ = ...° [2]

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Answer Key

Qn	Answers
1a	$V = 9\sqrt{p}$
1b	$V = 45$
1c	$\frac{1}{729}$
2a	$3x^2 + 13x + 14$
2b	$8x^2 - x$
3a	$(2x+3)(x+3)$
3b	$25(x-2)(x+2)$
3c	$(x-1)(y-1)$ or $(1-x)(1-y)$ or $-(x-1)(1-y)$ or $-(1-x)(y-1)$
3d	$(3x+4y)(2m-k)$
4a	$xy = 2$
4b	9801
4c	9991
5a	$\frac{5x-10}{6}$
5b	$\frac{x+10}{x^2+2x}$
6a	$\frac{1}{y}$
6b	$\frac{x}{2x-3}$
7a	$x = 2(y - T^2)$
7b	$x = 20\frac{1}{9}$
8a	$k = 4$
8b	$x = -1\frac{1}{2}$
9a	$x = \frac{1}{2}$
9b	$x = -\frac{1}{6}$
10a	Enlargement = 3, reduction = $\frac{1}{3}$
10b	$BC = 9$ cm
11a	$PS = 3$ cm
11b	$\angle PQR = 97°$

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SECONDARY TWO EXPRESS

MATHEMATICS
4048 / 02

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The total number of the marks for this paper is **60**.

60

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Answer **all** the questions.

1 **(a)** A map is drawn to a scale of 2 cm : 3 km.

(i) Express the scale of the map in the form $1 : r$. [1]

(ii) Calculate the actual area, in km^2, of a region Y, which is represented by $3\ cm^2$ on the map. [2]

(b) An area of $5\ cm^2$ on another map represents an actual area of $20\ km^2$. Calculate the actual distance, in km, represented by a length of 4 cm on the map. [2]

2 The rate, r, of a tap filling a tank is inversely proportional to the time, t, taken for the tank to be filled. When the rate is 6 l/min, the time taken is 12 minutes. If the rate is 16 l/min, find the time taken for the tank to be filled. [2]

3 Expand and simplify each of the following.

(a) $x(3x+2y)(c+d)$, [1]

(b) $2(4x-3)-(3x-1)^2$, [2]

(c) $(5y-3x+2)(-x-y)$. [2]

4 Using the special products of algebraic expressions of $a^2-b^2=(a+b)(a-b)$, factorise and simplify the expression $(x+y)^2-(x-y)^2$. [2]

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

(a) $\dfrac{3x^2y^3}{11u^2v} \div \dfrac{9xy^2}{11u^3v^2xy}$, [2]

(b) $\dfrac{8x-4x^2}{3y+5} \times \dfrac{5v+3vy}{(2-x)^2}$, [2]

(c) $\dfrac{7}{y-2}+\dfrac{y+3}{y^2+y-6}$, [2]

(d) $\dfrac{1}{(x+1)^2}+\dfrac{3(x-1)}{x+1}-2$. [3]

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6 The numerator of a fraction is 7 less than 3 times of its denominator. If 2 and 3 are added to the numerator and denominator respectively, the new fraction is equivalent to $\frac{7}{3}$. Find the original fraction.

[4]

7 Solve the following equations.

(a) $4x^2 - 24x + 36 = 0$,

[2]

(b) $(2x-5)^2 = 49$,

[3]

(c) $\frac{3}{x-2} = \frac{2x-1}{3}$.

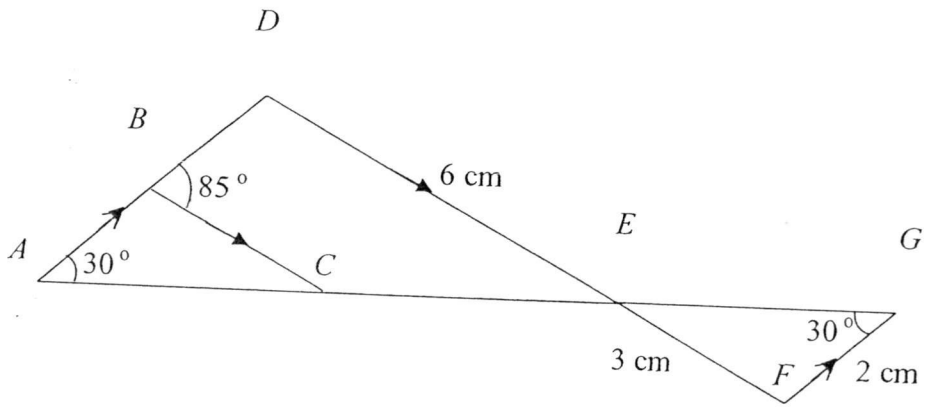
[3]

8 Solve the pair of simultaneous equations

[3]

$$x - 3y = 4,$$
$$2y + 5x = 3.$$

9 In the figure below, ΔABC and ΔGFE are congruent.



(a) Find $\angle ABC$,

[1]

(b) Find $\angle GFE$,

[1]

(c) Find the length of BC,

[1]

(d) State the triangle that is similar to ΔADE.

[1]

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10 Mr Eddie paid \$108 for some chairs. Each chair cost him \$$x$.

(a) Find an expression, in terms of x, for the number of chairs he bought. [1]

(b) He gave 2 of the chairs to a friend and sold all the remaining chairs each for \$2 more than its cost price.

(i) Find an expression, in terms of x, for the sum of money that he collected from the sale of the chairs. [2]

(ii) Mr Eddie made a profit of \$20 from the sale of the chairs. Form an equation, in terms of x, and show that it reduces to $x^2 + 12x - 108 = 0$. [3]

(iii) Solve the equation in **(b)(ii)** to find the number of chairs that Mr Eddie bought. [3]

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

The following table shows some of the values for the equation $y = x^2 - x + 1$.

x	-2	-1	0	1	2
y	7	3	1	k	3

(a) Find the value of k. [1]

(b) Using a scale of 4 cm to represent 1 unit for x-axis and 2 cm to represent 1 unit for y-axis, draw the graph $y = x^2 - x + 1$. [3]

(c) Using your graph, write down .

(i) the value of y when $x = 1.5$, [1]

(ii) the values of x when $y = 2.5$, [2]

(iii) the coordinates of the minimum point, [1]

(iv) the equation of the line of symmetry of the curve. [1]

----- **END OF PAPER** -----

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Answer Key

Qn	Answers
1(a)(i)	1 : 1 500
1(a)(ii)	$6\frac{3}{4}$
1(b)	8 km
2	$t = 4\frac{1}{2}$ min
3(a)	$3cx^2 + 3dx^2 + 2cxy + 2dxy$
3(b)	$-9x^2 + 14x - 5$
3(c)	$3x^2 - 5y^2 = 2xy - 2x - 2y$
4	$4xy$
5(a)	$\frac{x^2y^2uv}{3}$
5(b)	$\frac{4xv}{2-x}$
5(c)	$\frac{8}{y-2}$
5(d)	$\frac{x^2-4x-6}{(x+1)^2}$
6	
7(a)	$x = 3$
7(b)	$x = 6$ or $x = -1$
7(c)	$x = 10$ or $x = -6$
8	$x = 1$ and $y = -1$
9(a)	$\angle ABC = 95°$
9(b)	$\angle GFE = 95°$
9(c)	$BC = 3$ cm
9(d)	$BD = 2$ cm
9(e)	ΔADC or ΔGFE
10(a)	$\frac{108}{x}$ chairs
10(b)(i)	$\left(\frac{108}{x} - 2\right)(x+2)$
10(b)(iii)	18 chairs

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