CANDIDATE'S NAME	CLASS	REGISTER NUMBER

BALESTIER HILL SECONDARY SCHOOL
END OF YEAR EXAMINATION 2010
SECONDARY ONE EXPRESS

MATHEMATICS
Paper 1

4039/1

Friday   **8th October 2010**   **1 hour**

Additional Materials:
   Nil

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number in the spaces provided at the top of this page.
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.
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.

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

For Examiner's use:

/ 50

This paper consists of **10** printed pages (including this page).

[Turn over

ANSWER ALL QUESTIONS [50 MARKS]

1   **(a)**   Express   **(i)**   14.6895 to 2 decimal places,

                                        (ii)   28 447 to 2 significant figures.

    (b)   Without using a calculator, **estimate** the value of

$$\sqrt{220} - \sqrt[3]{355}$$

Ans: (a)i) _____   [1]

          (a)ii) _____   [1]

          (b) _____   [2]

2(a)   Find the prime factorization of 486 and write your answer in index notation.

2(b)   Hence, write down the smallest 2-digit number that is a factor of 486.

Ans: (a) _____   [2]

          (b) _____   [1]

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3.   Express each ratio in its simplest form.

   (a) $0.16 : \dfrac{5}{4}$

   (b) $400 \text{ m} : \dfrac{3}{5} \text{ km}$

Ans: (a) _____ [1]

       (b) _____ [2]

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4   **(a)**   If $x : y = 5 : 7$ and $x : z = 13 : 10$, find the ratio of $y : z$.

   (b)   Convert 3.5 m/s to km/h.

Ans: (a) _____ [2]

       (b) _____ km/h   [2]

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5   **(a)**   Express 25 cents as a percentage of $1.50.

(b)   Mr. Lai bought car in 2008 for $75 600. He sold it in 2010 for $36 800.
Find the percentage decrease in price.

Ans: (a) _____ % [1]

(b) _____ % [2]

6.   Write down the next term of the following sequences.

(a)   1, 8, 27, 64, _____

(b) $\dfrac{3}{7}, \dfrac{6}{13}, \dfrac{9}{19}, \dfrac{12}{25},$ _____

Ans: (a) _____ [1]

(b) _____ [1]

7 **(a)** Express 7.26 m^2 in cm^2.

(b) Express $34\ 860\ 000 \text{ cm}^3$ in m^3.

Ans: (a) _____ cm^2 [1]

(b) _____ m^3 [1]

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8. Evaluate the following.

(a) $5 \times (-4)^2 \div 2 + \sqrt[3]{27}$

(b) $\dfrac{\dfrac{2}{7} + \left(-\dfrac{24}{35}\right)}{\dfrac{7}{8}}$

Ans: (a) _____ [1]

(b) _____ [2]

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9. The school librarian bought 38 books, of which n were non-fiction books and the rest were fiction books. Each non-fiction book costs $18 and each fiction book costs $15.50. Write an expression in n,

(a) the number of fiction books, and

(b) the total cost the librarian paid for all the books.

Ans: (a) _____ [1]

(b) $ _____ [2]

10. Simplify the following.

(a) $7ab + 6a^2 - 13ba - 2a^2 + 3b^2c$

(b) $6(p - 7) - (5 - 4p)$

Ans: (a) _____ [1]

(b) _____ [2]

11.   Factorise the following completely.

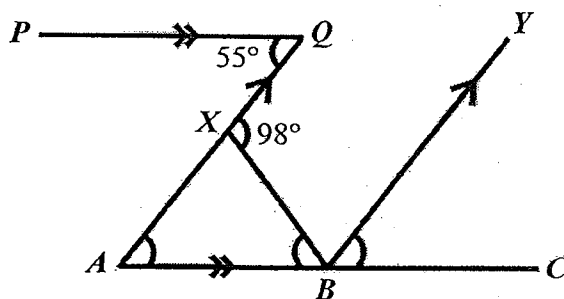   (a) $3m^2 - 12mn$

   (b) $ab - ay - bx + xy$

Ans: (a) _____ [1]

        (b) _____ [2]

12.   In the following figure, $\angle PQA = 55°$ and $\angle QXB = 98°$. Find

   (a) $\angle ABX$, and

   (b) $\angle YBC$.

Ans: (a) _____ [2]

        (b) _____ [1]

13. Solve the following equations.
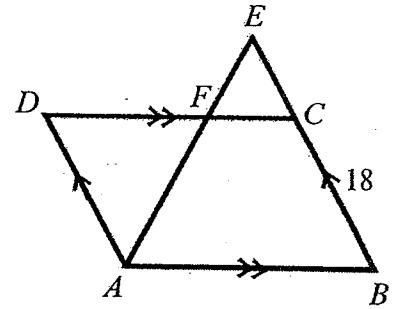
(a) $5x - 7 = 17 + 3(2 - x)$

(b) $\dfrac{x-3}{2} - 4 = \dfrac{7x}{3}$

Ans: (a) _____ [3]

(b) _____ [3]

14.   In the figure, $ABCD$ is a parallelogram and $BC = 18$ cm. The area of $\triangle ABE$ is $\dfrac{5}{6}$ that of $ABCD$.

(a)   Find the length of CE.

(b)   If the area of $ABCD$ is 450 cm^2, find the height from A to BC.

Ans: (a) _____ cm   [3]

(b) _____ cm   [1]

15. The axes below show 3 points, A, B and C.

(a)   Write down the coordinates of point A.

(b)   Point D is located at $(-4, 1)$. Plot and label clearly point D on the graph.

(c)   Write down the equation of the line AC.

(d)   Join the points starting from A to B, B to C, C to D and D to A to obtain a quadrilateral. Name the quadrilateral formed.
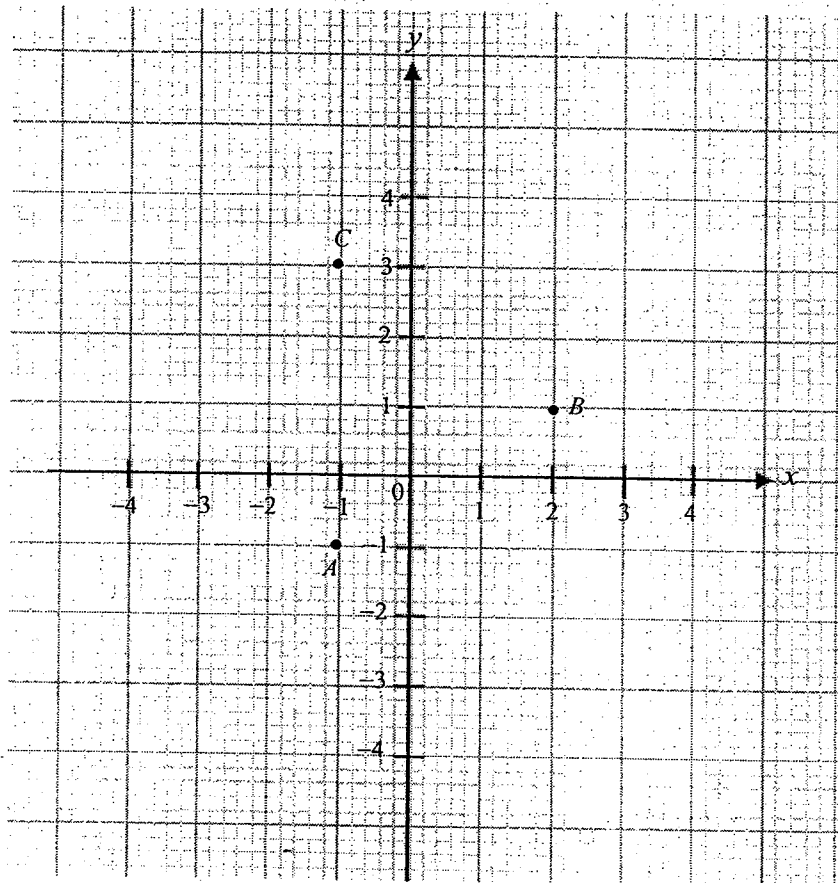
Ans: (a) (_____ , _____)   [1]

(b) From the graph   [1]

(c) _____   [1]

(d) _____   [1]

END OF PAPER

Answers

1(a)(i)	14.69
1(a)(ii)	28000
1(b)	$\sqrt{220} - \sqrt[3]{355} = \sqrt{225} - \sqrt[3]{343}$ $= 15 - 7$ $= 8$
2(a)	2×3^5
2(b)	18
3(a)	16 : 125
3(b)	2 : 3
4(a)	91 : 50
4(b)	12.6 km/h
5(a)	$16\frac{2}{3}\%$
5(b)	$51\frac{61}{189}\%$ or 51.3% (3sf)
6(a)	125
6(b)	$\frac{15}{31}$
7(a)	72600 cm^2
7(b)	34.86 m^3
8(a)	43
8(b)	$-\frac{16}{35}$ or -0.457 (3sf)
9(a)	$38 - n$
9(b)	Total cost $= 18n + 15.5(38 - n)$ $= 18n + 589 - 15.5n$ $= \$(2.5n + 589)$
10(a)	$-6ab + 4a^2 + 3b^2c$
10(b)	$6(p - 7) - (5 - 4p) = 6p - 42 - 5 + 4p$ $= 10p - 47$
11(a)	$3m(m - 4n)$

11(b)	$ab - ay - bx + xy = a(b - y) - x(b - y)$ $= (b - y)(a - x)$
12(a)	$\angle QAB = 55°$ $\therefore \angle ABX = 98 - 55 = 43°$
13(a)	$5x - 7 = 17 + 3(2 - x)$ $5x - 7 = 17 + 6 - 3x$ $8x = 30$ $x = 3\dfrac{3}{4}$
13(b)	$\dfrac{x - 3}{2} - 4 = \dfrac{7x}{3}$ $\dfrac{x - 11}{2} = \dfrac{7x}{3}$ $3(x - 11) = 14x$ $3x - 33 = 14x$ $11x = -33$ $x = -3$
14(a)	Area of $\triangle ABE = \dfrac{5}{6} \times$ Area of ABCD $\dfrac{1}{2} \times h \times BE = \dfrac{5}{6} \times 18 \times h$ $\dfrac{BE}{2} = 15$ $BE = 30$ $\therefore CE = 30 - 18 = 12 \text{ m}$
14(b)	25 cm
15(a)	$(-1, -1)$
15(b)	$x = -1$
15(c)	Rhombus

BALESTIER HILL SECONDARY SCHOOL
END OF YEAR EXAMINATION 2010
SECONDARY ONE EXPRESS

MATHEMATICS   **4039/2**
Paper 2

Wednesday   13th October 2010   **1 hour 30 minutes**

Additional Materials:
    Writing Paper x 4
    Graph Paper x 1
    Blank A4 Paper x 1

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the pieces of 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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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 of part question.
The total number of marks for this paper is 50.

For Examiner's use:

/ 50

This paper consists of <u>5</u> printed pages, including this cover page

[Turn over

ANSWER ALL THE QUESTIONS [50 MARKS]

1(a) Ryan can enter 14 characters every 4 seconds using his mobile phone.

    (i)   How many characters can he enter in 1 minute?   [1]

    (ii)   How long would he take to complete a message of 119 characters? [1]

1(b) Sato Yuka from Japan won the gold medal in the Women's Triathlon during the recent Youth Olympics Games. She swam 750 m in 9.5 minutes, cycled 20 km in 32 minutes and ran 5 km in 18 minutes. Calculate her

    (i)   speed in m/s for the swim segment,   [1]

    (ii)   speed in km/h for the run segment, and   [1]

    (iii)   average speed for the competition in km/h.   [2]

2(a) The results of a recent census conducted in Singapore showed that the number of babies younger than one year has dropped from 40, 813 in Year 2000 to 32, 788 in Year 2010. Find the percentage decrease in the number of babies.   [2]

2(b) A goldsmith would make a profit of 15% of the cost price by selling a diamond bracelet during a sale for $5 448.

    (i)   Calculate the cost price of the bracelet, correct to the nearest dollar.   [2]

    (ii)   Mr. Lai, a regular customer, is entitled to a discount of 8% off the marked price of the bracelet. How much would he need to pay for the bracelet after the discount?   [1]

    (iii)   Calculate the percentage profit earned by the goldsmith after selling the diamond bracelet to Mr. Lai.   [1]

3(a) Factorise completely $5d(b - 2a) + 4c(2a - b)$.   [2]

3(b) If $a = -6$, $b = -4$ and $c = 3$, find the value of $\dfrac{a - (3b)^2}{5c^2 - a}$.   [2]

4. Sticks of equal length are used to make a series of patterns. The first 3 patterns are shown below.

Pattern No.	1st	2nd	3rd
Diagram			
No. of sticks used	4	10	16

(a) Write down the number of sticks needed in the 4th and 10th patterns. [2]

(b) Write down, in terms of n, the number of sticks needed in the nth pattern.

[2]

(c) Explain why 300 sticks cannot be used to form one of the patterns. [1]

5. The cross-section of a canal is a trapezium which measures 7 m at the top, 5 m at the bottom and has a depth of 3 m. Water flows through the canal at a speed of 3.5 m/s.

7 m

3 m

5 m
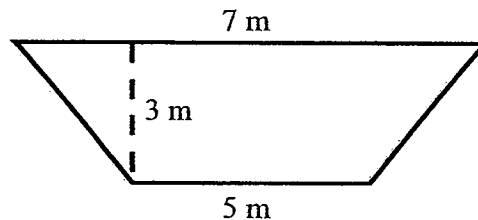
(a) Find the cross-sectional area of the canal. [2]

(b) Assuming the water completely fills the canal, find the volume of water that flows through the canal in 5 seconds. [2]

6.   The diagram shows a circle, with centre O, of diameter 11 cm inscribed in a regular pentagon of sides 8 cm each. Taking $\pi = 3.142$,

   (a)   find the area of the regular pentagon, and   [2]

   (b)   find the area of the shaded part, correct to 3 significant figures.   [2]

11 cm

O

8 cm

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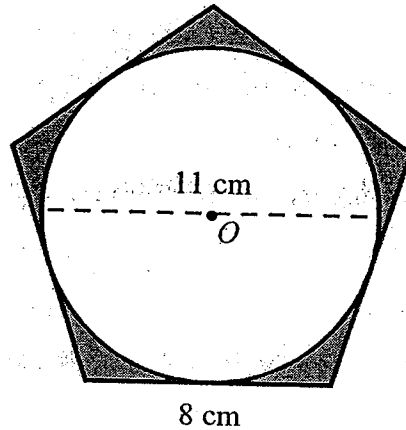
7.   The diagram shows a regular hexagon $ABCDEF$ and a regular polygon sharing a common side ED. $GEDH$ are parts of the sides of the regular polygon.

   (a)   Find $\angle CDE$.   [1]

   (b)   Given $\angle CDH = 105°$, find the number of sides of the regular polygon.   [3]
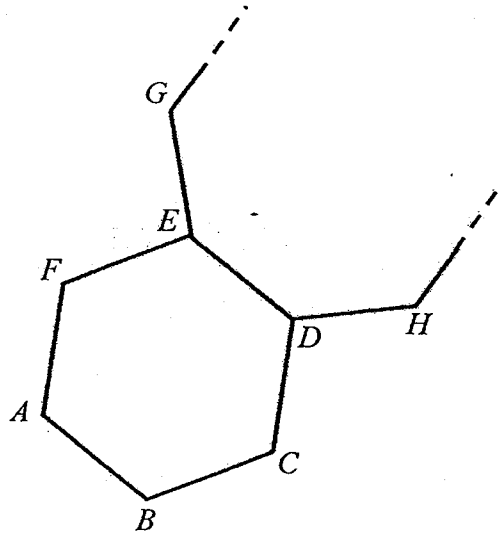
8. Joey sold pencils at $0.50 each and markers at $2 each during a charity fair. She sold 40 pencils and markers altogether and collected a total of $59.

    (a) If Joey sold p number of pencils, express, in terms of p, the number of markers that she sold. **[1]**

    (b) Form an equation in p, connecting the cost of pencils and markers that were sold by her. **[1]**

    (c) Hence, solve the equation to find the number of markers sold. **[3]**

Answer this question on a piece of blank paper.

9. Construct $\triangle XYZ$ in which $XY = 7$ cm, $\angle XYZ = 60°$ and $\angle YXZ = 70°$. **[2]**

    (a) Measure and write down the length of XZ. **[1]**

    (b) Construct the bisector of $\angle XZY$. **[1]**

    (c) Construct the perpendicular bisector of YZ. **[1]**

Answer this question on a piece of graph paper.

10. Petrol leaks from a car's oil tank, which is initially full, at a constant rate. y is the volume of petrol in the tank in litres. At time x minutes, the volume of petrol in the tank is given by $y = -3x + 60$ for values of x from 0 to 25.

    (a) Using a scale of 2 cm to represent 5 units on the x-axis and 2 cm to represent 10 units on the y-axis, draw the graph of $y = -3x + 60$ for $0 \le x \le 25$. **[3]**

    (b) Find the gradient of the graph. **[1]**

    (c) From the graph, find

        (i) the volume of the tank, **[1]**

        (ii) the volume of the petrol after 12 minutes, and **[1]**

        (iii) the time taken for the tank to be completely empty. **[1]**

END OF PAPER

Answers

1(a)(i)	210 characters
1(a)(ii)	34s
1(b)(i)	Swimming speed $= \dfrac{750}{9.5 \times 60}$ $= 1\dfrac{6}{19}$ m/s or 1.32 m/s (3sf)
1(b)(ii)	$16\dfrac{2}{3}$ km/h or 16.7 km/h (3sf)
1(b)(iii)	Total distance $= 25.75$ km Total time $= \dfrac{59.5}{60}$ hr Average speed $= \dfrac{25.75}{59.5/60}$ $= 25\dfrac{115}{119}$ km/h or 26.0 km/h (3sf)
2(a)	% decrease $= \dfrac{40813 - 32788}{40813} \times 100$ $= 19.7\%$ (3sf)
2(b)(i)	115% --- \$5448 100% --- $\dfrac{5448}{115} \times 100 = \$4737$ (nearest dollar)
2(b)(ii)	$0.92 \times 5448 = \$5012.16$
2(b)(iii)	% profit $= \dfrac{5012.16 - 4737}{4737} \times 100$ $= 5.81\%$ (3sf)
3(a)	$5d(b - 2a) + 4c(2a - b) = 5d(b - 2a) - 4c(-2a + b)$ $= (b - 2a)(5d - 4c)$
3(b)	$\dfrac{a - (3b)^2}{5c^2 - a} = \dfrac{-6 - [3(-4)]^2}{5(3)^2 - (-6)}$ $= \dfrac{-6 - (-12)^2}{45 + 6}$

	$= -2\frac{16}{17}$ or -2.94 (3sf)
4(a)	$T_4 = 22$; $T_{10} = 58$
4(b)	$T_n = 4 + 6(n-1)$ $= 4 + 6n - 6$ $= 6n - 2$
4(c)	$6n - 2 = 300$ $6n = 302$ $n = 50.3$ Since n is not a whole number, 300 sticks cannot be used to form one of the patterns. It's either short of 4 sticks or excess of 2 sticks.
5(a)	18 m^2
5(b)	Length of water in 5s $= 3.5 \times 5 = 17.5$ m Volume of water $= 18 \times 17.5 = 315$ m^3
6(a)	Area of pentagon $= 5 \times (\frac{1}{2} \times 8 \times 5.5)$ $= 110$ cm^2
6(b)	Area of circle $= 3.142 \times 5.5^2 = 95.0455$ cm^2 Area of shaded part $= 110 - 95.0455 = 14.9545$ cm^2
7(a)	$\angle CDE = \dfrac{180(6-2)}{6} = 120°$
7(b)	$\angle EDH = 360 - 120 - 105 = 135°$ Exterior angle of polygon $= 180 - 135 = 45°$ Number of sides of regular polygon $= \dfrac{360}{45} = 8$
8(a)	$40 - p$
8(b)	$0.5p + 2(40 - p) = 59$
8(c)	$0.5p + 80 - 2p = 59$ $1.5p = 21$ $p = 14$ Number of markers sold $= 40 - 14 = 26$

9(a)	$XZ = 7.8$ cm
10(b)	Gradient $= -3$
10(c)(i)	60 litres
10(c)(ii)	24.5 litres
10(c)(iii)	20 minutes