

Candidate Name \_\_\_\_\_

Class	Index Number

YUHUA SECONDARY SCHOOL  
END-OF-YEAR Examination 2010  
Secondary Two Express



**4016/01**

**MATHEMATICS**  
**PAPER 1**

**TIME** 1 hour 30 minutes

Candidates answer on the Question Paper

**READ THESE INSTRUCTIONS FIRST**

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

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.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$

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 60.

<b>For Examiner's Use</b>	
Total	60

**This question paper consists of 10 printed pages and 0 lined pages.**

**[TURN OVER**

**Answer all the questions (Total: 60 marks)**

- 
1. (a) Express  $\frac{3}{40}$  as a percentage.  
(b) Express 1.4% as a fraction in its lowest term.

(a). \_\_\_\_\_ % [1]

(b). \_\_\_\_\_ [1]

- 
2. Expand and simplify the following expressions.

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

(b)  $(3y + 2)^2 - 6y(y + 1)$

(a). \_\_\_\_\_ [2]

(b). \_\_\_\_\_ [2]

3. (a) Factorise  $2x^2 + 15x + 7$ .

(b) Hence, or otherwise, solve the equation  $2x^2 = -15x - 7$ .

(a). \_\_\_\_\_ [2]

(b).  $x =$  \_\_\_\_\_ or \_\_\_\_\_ [2]

---

4. Simplify the following.

(a)  $\frac{2x^2}{4x^3y} \div \frac{8xy^3}{32yx^2}$

(a). \_\_\_\_\_ [2]

(b)  $\frac{6y}{3ay - 6by - 2az + 4bz} - \frac{2}{a - 2b}$

(b). \_\_\_\_\_ [3]

5.

(a) Given that  $m = \sqrt{\frac{nq}{p} - n^2}$ , make  $p$  the subject of the formula.

(b) Given that  $n = -4$ ,  $m = 3$  and  $q = 1$ , find the value of  $p$ .

(a). \_\_\_\_\_ [2]

(b). \_\_\_\_\_ [1]

6. Solve the following pair of simultaneous equations.

$$7x + 6y - 33 = 0$$

$$5x - 4y = 7$$

$x =$  \_\_\_\_\_  $y =$  \_\_\_\_\_ [3]

7. (a) Solve the inequality  $9x - 11 < 7x - 5$   
 (b) Hence find the largest integer value of  $x$

(a). \_\_\_\_\_ [1]

(b). \_\_\_\_\_ [1]

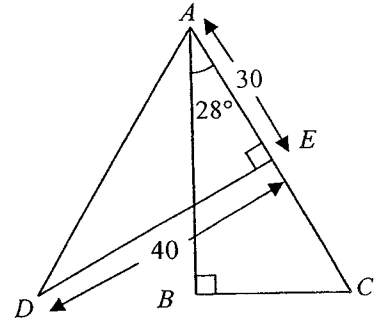
- (c) Solve the equation  $2(11 - x^2) = 4$

(c). \_\_\_\_\_ [2]

8.  $\triangle ABC \cong \triangle DEA$  and  $\angle BAC = 28^\circ$ ,  $AE = 30$ ,  $DE = 40$

(a) find  $\angle BAD$ .

(b) find  $EC$ .



(a). \_\_\_\_\_ [2]

(b). \_\_\_\_\_ [2]

9. Given that  $F$  is directly proportional to  $M^3$ .
- (a) Write an equation connecting  $F$  and  $M$ , with  $F$  as the subject of the equation.
- (b) Complete the table below.

$M$	2	3	
$F$	288		100

[2]

(a). \_\_\_\_\_ [2]

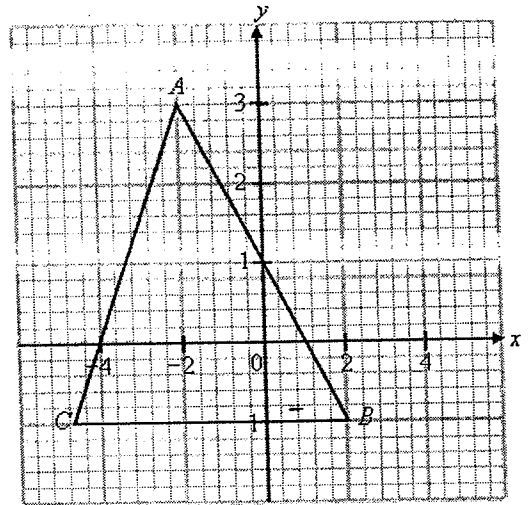
10. (a) Express in set builder notation  $\{2, 3, 5, 7, 11, \dots\}$ .
- (b) List all the proper subset of the set  $S = \{\text{red, blue}\}$ .
- (c) If  $A \subset B$  and  $B \subset C$ , describe the relation between  $A$  and  $C$ .

(a). \_\_\_\_\_ [1]

(b). \_\_\_\_\_ [1]

(c). \_\_\_\_\_ [1]

11. (a) Find the gradient of line  $AB$ .  
 (b) Find the gradient of line  $CB$ .  
 (c) Write down the equation for line  $CB$ .



- (a). \_\_\_\_\_ [2]  
 (b). \_\_\_\_\_ [1]  
 (c). \_\_\_\_\_ [1]

12. (a) Find the 5<sup>th</sup> term of the sequence 10, 13, 19, 28, ...  
 (b) Find the general term of the sequence 200, 203, 206, 209, ...  
 (c) Using the general term found in part (b), calculate the 25<sup>th</sup> term of the sequence.

- (a). \_\_\_\_\_ [1]  
 (b). \_\_\_\_\_ [1]  
 (c). \_\_\_\_\_ [1]

13. Amount of money spent on lunch base on a survey of 20 person

Stem	Leaf
3	2 5 6 6
4	3 3
5	1 4 8 9
6	0 0 2 2 4 4 8
7	0 1
8	1

Key: 3 | 2 means \$3.20

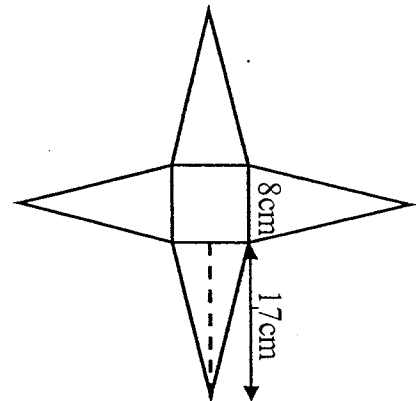
- (a) Find the median lunch expense.
- (b) What is the percentage of people who spend less than \$4 on lunch?

(a). \$ \_\_\_\_\_ [1]

(b). \_\_\_\_\_ % [1]

14. The figure below shows the net of a regular right square pyramid

- (a) Calculate the surface area of the pyramid.
- (b) Calculate the volume of the pyramid.



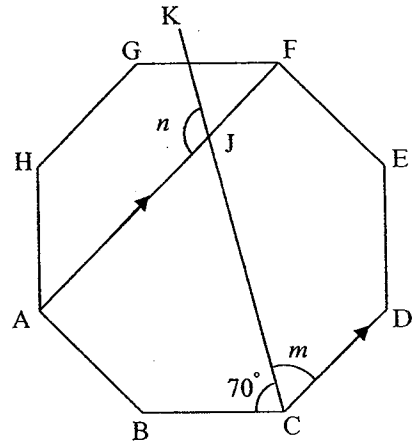
(a). \_\_\_\_\_  $\text{cm}^2$  [2]

(b). \_\_\_\_\_  $\text{cm}^3$  [2]



15. Given that figure  $ABCDEFGH$  is a regular octagon, and  $AF$  is parallel to  $CD$

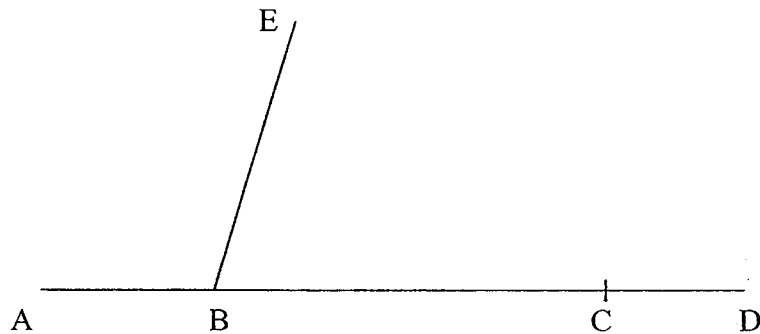
- (a) Show that angle  $m$  is  $65^\circ$
- (b) Hence find the unknown angle  $n$



(a). shown [2]

(b).  $n =$  [1]

- 16. (a) Construct the angle bisector of  $\angle EBC$
- (b) Hence construct a new triangle  $\triangle BCF$  such that  $\angle BCF$  is a right angle and  $F$  lies on the constructed angle bisector.  
(all construction lines must be clearly shown)
- (c) Measure  $\angle BFC$

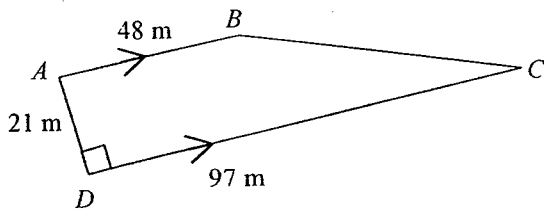


(a). constructed [1]

(b). constructed [1]

(c).                      [1]

17.



The figure shows a piece of land  $ABCD$ .  $AB \parallel DC$  and  $\angle ADC = 90^\circ$ .

- (a) Find the area of the piece of land
- (b) Show that the perimeter of the piece of land is 219.3m, corrected to 4 decimal point
- (c) John takes 2 minute to jog around the perimeter of the piece of land. Calculate his speed in m/sec.

- (a). \_\_\_\_\_  $m^2$  [1]
- (b). shown \_\_\_\_\_ [2]
- (c). \_\_\_\_\_ m/sec [2]

**Check your work!**  
**End of paper ☺**

**YUHUA SECONDARY SCHOOL**  
**End-of-Year Examination 2010**  
**Secondary Two Express**

Mathematics  
 PAPER 1 Marking Scheme

Question	Solutions	Marks Allocated
1	a) 7.5% b) $\frac{7}{500}$	A1 A1
2	a) $(2x-5)(4x+3)$ $= 8x^2 + 6x - 20x - 15$ $= 8x^2 - 14x - 15$  b) $(3y+2)^2 - 6y(y+1)$ $= (9y^2 + 12y + 4) - 6y^2 - 6y$ $= 3y^2 + 6y + 4$	M1 A1  M1 A1
3	a) $2x^2 + 15x + 7$ $= (2x+1)(x+7)$  b) $x = -0.5$ or $x = -7$	M1 cross method A1 A2
4	a) $\frac{2x^2}{4x^3y} \div \frac{8xy^3}{32yx^2}$ $= \frac{2x^2}{4x^3y} \times \frac{32yx^2}{8xy^3}$ $= \frac{2}{y^3}$  b) $\frac{6y}{3ay - 6by - 2az + 4bz} - \frac{2}{a - 2b}$ $= \frac{6y}{3ay - 6by - 2az + 4bz} - \frac{2}{a - 2b}$ $= \frac{6y}{3y(a - 2b) - 2z(a - 2b)} - \frac{2}{a - 2b}$ $= \frac{6y}{(a - 2b)(3y - 2z)} - \frac{2(3y - 2z)}{(2 - ab)(3y - 2z)}$ $= \frac{4z}{(a - 2b)(3y - 2z)}$	M1 A1  M1 M1 A1

5	<p>a) <math>m = \sqrt{\frac{nq}{p} - n^2}</math>  <math>m^2 = \frac{nq}{p} - n^2</math>  <math>\frac{nq}{p} = m^2 + n^2</math>  <math>p = \frac{nq}{m^2 + n^2}</math></p> <p>b) <math>p = -0.16</math> or <math>p = -\frac{4}{25}</math></p>	<p>M1</p> <p>A1</p> <p>A1</p>								
6	<p>a) <math>x = 3</math> and <math>y = 2</math></p>	<p>M1 substitution or elimination method A2</p>								
7	<p>a) <math>x &lt; 3</math>  b) largest integer <math>x</math> is 2  c) <math>x = 3</math> or <math>x = -3</math></p>	<p>A1  A1  A2</p>								
8	<p>a) <math>\angle BCA = 180 - 90 - 28 = 62^\circ</math> (sum of <math>\angle</math> in <math>\Delta</math>)  <math>\angle EAD = 62^\circ</math> (congruent <math>\angle</math>)  <math>\angle BAD = 62 - 28 = 34^\circ</math></p> <p>b) <math>DA = \sqrt{40^2 + 30^2} = 50</math> (Pythagoras theorem)  <math>AC = DA</math> (congruent sides)  <math>EC = 50 - 30 = 20</math></p>	<p>M1  A1</p> <p>A1</p>								
9	<p>a) <math>F = kM^3</math>  <math>F = 36M^3</math></p> <table border="1"> <tbody> <tr> <td><math>M</math></td> <td>2</td> <td>3</td> <td>1.41 (3s.f.)</td> </tr> <tr> <td><math>F</math></td> <td>288</td> <td>972</td> <td>100</td> </tr> </tbody> </table>	$M$	2	3	1.41 (3s.f.)	$F$	288	972	100	<p>B1  B1</p> <p>A2</p>
$M$	2	3	1.41 (3s.f.)							
$F$	288	972	100							
10	<p>a) <math>\{x: x \text{ is a prime number}\}</math>  b) <math>\{\text{blue}\}, \{\text{red}\}, \{\}</math> or <math>\phi</math>  c) <math>A \subset C</math></p>	<p>B1  B1  B1</p>								
11	<p>a) <math>\text{gradient} = \frac{\text{rise}}{\text{run}} = \frac{4}{-4} = -1</math>  b) gradient of straight line is zero  c) <math>y = -1</math></p>	<p>M1  A1</p> <p>A1  A1</p>								

12	a) 40 b) Either $197+3n$ or $200+3(n-1)$ c) 272	A1 A1 A1
13	a) median is \$5.95 b) 20%	A1 A1
14	a) SA of pyramid $= 8^2 + 4\left(\frac{1}{2} \times 8 \times 17\right)$ $= 336\text{cm}^2$  b) height of pyramid $= \sqrt{17^2 - 4^2} = \sqrt{273}\text{cm}$ (Pythagoras) Vol. pyramid $= \frac{1}{3} \times 8^2 \times \sqrt{273} = 352.4 = 352\text{cm}^3$ (to 3 s.f.)	M1 A1  M1 A1
15	a) sum of int angles of octagon $= (n-2)180^\circ = 1080^\circ$ $m = 135 - 70 = 65^\circ$  b) $\angle FJC = 180 - m$ (corr. $\angle$ ) $= 115^\circ$ $n = 115^\circ$ (vert. opps. $\angle$ )	M1 A1  M1 A1
16		B1 angle bisector  B1 triangle BCF  A1 $53^\circ$ to $55^\circ$  Do not award marks if construction lines are not visible.
17	a) Area of land $= \frac{1}{2}(48+97) \times 21 = 1522.5\text{m}^2 = 1520\text{m}^2$ (3 s.f.)  b) using Pythagoras theorem, $BC = \sqrt{21^2 + (97-48)^2} = \sqrt{2842}$ or 53.31 Perimeter $= 21 + 48 + 97 + \sqrt{2842} = 219.31 = 219.3\text{m}^2$ (correct to 1d.p.)  c) Speed $= \frac{\text{distance}}{\text{time}} = \frac{219.3}{2 \times 60}$ $= 1.8275 = 1.83\text{m/sec}$ (3 s.f.) or $1\frac{331}{400}$	A1  M1 A1 (shown)  M1 A1



Candidate Name \_\_\_\_\_

Class	Index Number

YUHUA SECONDARY SCHOOL  
END-OF-YEAR Examination 2010  
Secondary Two Express



**4016/02**

**MATHEMATICS**  
PAPER 2

Additional Materials: Graph paper (1 sheet)

**TIME** 2 hours  
Candidates answer on the Question Paper

**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.

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.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$

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 of the marks for this paper is 80.

<b>For Examiner's Use</b>	
Total	80

This question paper consists of 14 printed pages and 0 lined pages.

[TURN OVER

**Answer all the questions (Total: 80 marks)**

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1. (a) Expand and simplify  $(m^2 - 9)(2m + 1)$

(b) Expand and simplify  $8x - 2x(x - 3)$

(a). \_\_\_\_\_ [2]

(b). \_\_\_\_\_ [2]

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2. (a) Simplify  $\frac{2x + 14}{x^2 + 14x + 49}$

(b) Simplify  $u^2 - (u - a)(u + a)$

(c) Using the solution to part (b), evaluate the value of  $16947^2 - 16944 \times 16950$  without using a calculator.

(a). \_\_\_\_\_ [2]

(b). \_\_\_\_\_ [2]

(c). \_\_\_\_\_ [2]

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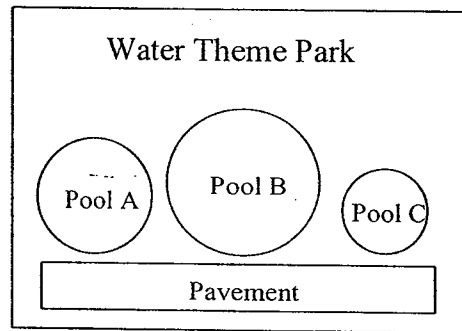
3. A product was originally sold at a profit of 20% on the cost price. In a promotion, a 20% discount was given.
- (a) Determine the discounted price as a percentage of the cost price.
  - (b) Did the sale make a profit or a loss?
  - (c) Determine the largest percentage discount that can be given during the promotion without making a making a lost. The percentage discount must be an integer.

(a). \_\_\_\_\_ % [2]

(b). \_\_\_\_\_ [1]

(c). \_\_\_\_\_ % [2]

4. A water theme park consists of 3 circular pools A, B and C. The map of the water theme park is drawn to a scale of 1cm to 40m.
- Express the scale in the form 1 :  $n$ .
  - The pavement has a length 116m. Find its length on the map in cm.
  - Pool A has an area of  $0.6\text{cm}^2$  on the map. Find its actual area in  $\text{m}^2$ .
  - The ratio of the area of Pool A to Pool B is 3:5. The ratio of the area of Pool B to Pool C is 3:1. Find the ratio Pool A to Pool C expressed in its simplest form.



- \_\_\_\_\_ [1]
- \_\_\_\_\_ cm [1]
- \_\_\_\_\_  $\text{m}^2$  [2]
- \_\_\_\_\_ : \_\_\_\_\_ [1]

5. The area  $A$  of a trapezium with parallel sides  $x$  and  $y$ , and height  $h$  is given by the

$$\text{formula } A = \frac{1}{2}(x + y)h.$$

- (a) Calculate the area of the trapezium  $h=5\text{cm}$ ,  $x=3\text{cm}$  and  $y=6\text{cm}$   
(b) Rearrange the formula to express  $h$  in terms of  $A$ ,  $x$  and  $y$   
(c) Rearrange the formula to express  $y$  in terms of  $A$ ,  $x$ , and  $h$   
(d) Calculate the new height if  $x$  and  $y$  remains unchanged, and  $A = 36\text{cm}^2$

- (a). \_\_\_\_\_  $\text{cm}^2$  [1]  
(b). \_\_\_\_\_ [1]  
(c). \_\_\_\_\_ [2]  
(d). \_\_\_\_\_  $\text{cm}$  [1]

6. At a factory sale, a man paid \$480 for  $x$  number of T-shirts. When he returned home, he threw away 10 of them which had irremovable stains. He sold the rest of the T-shirts, making a profit of \$3 on each T-shirt.
- (a) Express in terms of  $x$ , the amount of money that the man paid for each T-shirt
- (b) Express in terms of  $x$ , the price at which he sold each T-shirt.
- (c) After selling all the T-shirts, he found that his sale totaled to \$630. Form an equation in  $x$  and show that it can be simplified to  $x^2 - 60x - 1600 = 0$
- (d) Solve this equation and find the number of T-shirts that he bought.

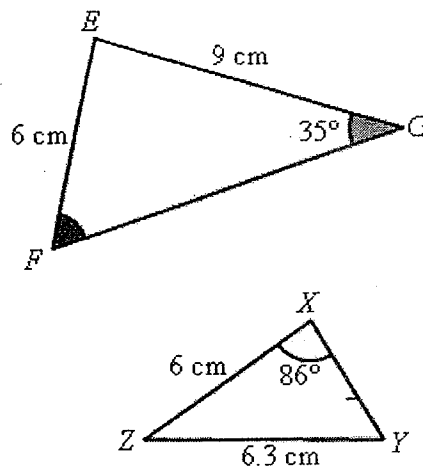
(a). \$ \_\_\_\_\_ [1]

(b). \$ \_\_\_\_\_ [1]

(c). shown \_\_\_\_\_ [2]

(d). \_\_\_\_\_ [2]

7. Given  $\triangle EFG$  is similar to  $\triangle XYZ$
- Calculate  $\angle EFG$
  - Calculate the scale factor, taking  $\triangle XYZ$  as an image of  $\triangle EFG$
  - Calculate  $YX$



- \_\_\_\_\_ ° [2]
- \_\_\_\_\_ [1]
- \_\_\_\_\_ cm [1]

8. It takes 5 men to paint a house in 4 days. Given that all the men work at the same rate,
- Find how long it would take 8 men to paint the same house.
  - If one out of the 5 men fall sick and was unable to turn up for work on the last day, how much additional time is needed to complete the job?
  - How long would it take 2 men to paint 3 such houses?

- \_\_\_\_\_ days [1]
- \_\_\_\_\_ days [2]
- \_\_\_\_\_ days [2]

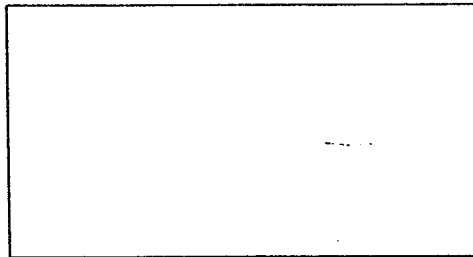
9. It is given that  $\varepsilon = \{x : x \text{ is an integer and } 1 \leq x \leq 10\}$ ,

$P = \{x : x \text{ is an even number}\}$

$Q = \{x : x \text{ is a multiple of } 4\}$

- (a) Draw a Venn diagram to show the relationship of  $P$  and  $Q$  marking the elements in each region clearly.
- (b) Describe the relation between  $Q$  and  $P$ .
- (c) List the elements of  $(P \cap Q)'$
- (d) Find  $n(Q' \cap P)$

Answer (a)



[2]

(b). \_\_\_\_\_ [1]

(c). \_\_\_\_\_ [1]

(d). \_\_\_\_\_ [1]

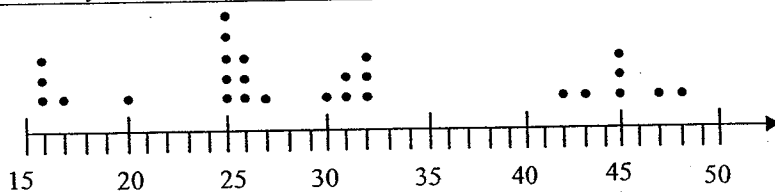
10. There are 25 black marbles and some white marbles in a box. The probability of randomly picking a white marble is  $\frac{4}{9}$ .

- (a) Find the number of white balls in the box.
- (b) If 5 more new black marbles are placed in the box, find the new probability of randomly picking a white marble.

(a). \_\_\_\_\_ [2]

(b). \_\_\_\_\_ [2]

11.



The dot diagram shows the marks scored by 27 students in a class test.

- (a) Find the range of marks.
- (b) Find the modal test score.
- (c) Briefly describe the distribution of the data.

- (a). \_\_\_\_\_ [1]
- (b). \_\_\_\_\_ [1]
- (c). \_\_\_\_\_ [1]

12. The weekly savings of a group of students are tabulated in the given table.

Savings ( $x$ \$)	Frequency ( $f$ )
$0 < x \leq 2$	5
$2 < x \leq 4$	15
$4 < x \leq 6$	20
$6 < x \leq 8$	25
$8 < x \leq 10$	10

- (a) Estimate the mean for weekly savings.
- (b) If 5 students who saved \$ $y$  was added to the group, and the new estimated mean weekly savings changed to \$5.25, determine the range that the students belong to.

(a). \$ \_\_\_\_\_ [2]

(b). \_\_\_\_\_ <  $y$  ≤ \_\_\_\_\_ [2]



13. A metal sculpture is made by joining together a cylinder and a hemisphere.

(a) Find the volume of the sculpture. Leave your answer **in terms of  $\pi$**

(b) The sculpture is melted and re-made into a cone. Given that the radius of base of the cone is 3m,

(i) Show that the vertical height  $h$  of the cone is 6.5m

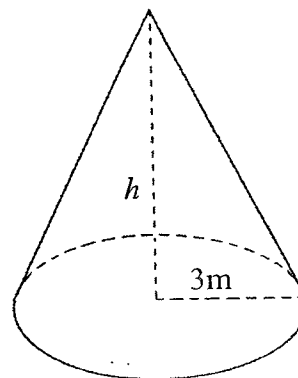
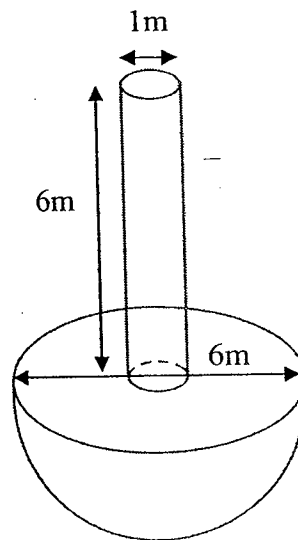
(ii) Find the slant height of the cone

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

Curved surface area of a cone =  $\pi r l$

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

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

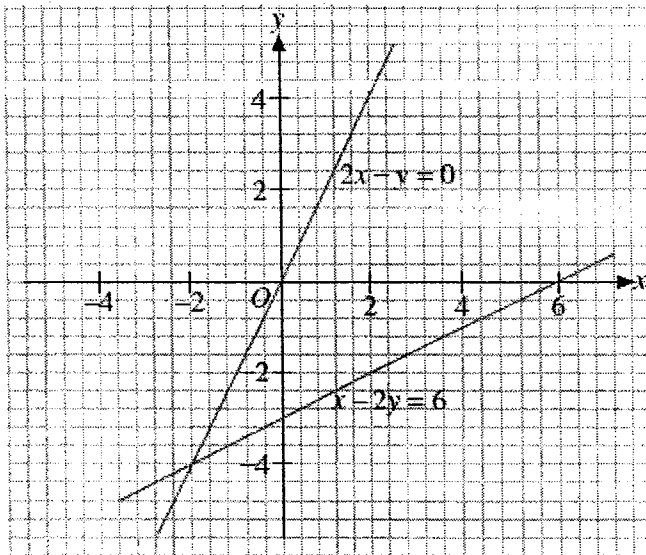


(a). \_\_\_\_\_  $\text{m}^3$  [3]

(bi). shown \_\_\_\_\_ [2]

(bii). \_\_\_\_\_ m [2]

14.



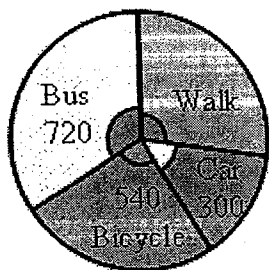
- (a) Solve the pair of equations  $2x - y = 0$  and  $x - 2y = 6$  using the graph
- (b) On the graph, draw the line  $x = 2$
- (c) Find the area of the triangle bounded by the three lines

(a).  $x = \underline{\hspace{1cm}}$   $y = \underline{\hspace{1cm}}$  [1]

(b). drawn [1]

(c).                                  [1]

15.



The pie chart shows the means of transport to school for 2160 students. A student is interviewed at random.

- What is the probability that the student cycles to school?
- What is the probability that the student did not walk to school?
- If the school population increased by 5% and all the new students take the bus to school, what is the probability of choosing a student that travel by bus to school?

- (a). \_\_\_\_\_ [1]  
(b). \_\_\_\_\_ [1]  
(c). \_\_\_\_\_ [2]

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

Attach your graph paper to your answer sheet.

The given table of values are for  $y = -10 + 5x - x^2$

$x$	0	1	2	3	4	5
$y$	-10	$a$	-4	$b$	-6	-10

- (a) Calculate the value of  $a$  and  $b$ . [2]
- (b) Using a scale of 2 cm to represent 1 unit on each axis, draw the graph of  $y = -10 + 5x - x^2$  for  $0 \leq x \leq 5$  [3]
- (c) Use your graph to find the value of  $y$  when  $x = 1.5$ . [1]
- (d) Use your graph to find the value of  $x$  when  $y = -7$ . [2]
- (e) State the coordinates of the maximum point of the graph [1]
- (f) Draw the line of symmetry and state its equation. [1]

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*Check your work!*

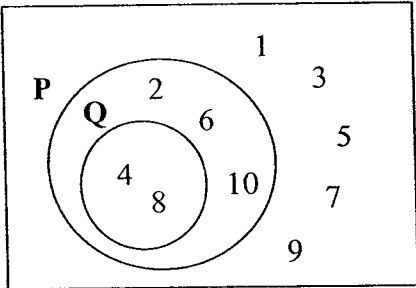
*End of paper ☺*

YUHUA SECONDARY SCHOOL  
 End-of-Year Examination 2010  
 Secondary Two Express

Mathematics  
 PAPER 2 Marking Scheme

Question	Solutions	Marks Allocated
1	a) $(m^2 - 9)(2m + 1)$ $= 2m^3 + m^2 - 18m - 9$  b) $8x - 2x(x - 3)$ $= 8x - 2x^2 + 6x$ $= -2x^2 + 14x$	A2  M4  A1
2	a) $\frac{2x+14}{x^2+14x+49} = \frac{2(x+7)}{(x+7)(x+7)}$ $= \frac{2}{x+7}$  b) $u^2 - (u-a)(u+a) = u^2 - (u^2 - a^2)$ $= a^2$  c) Let $u$ be 16947, and $a=3$ $16947^2 - (16947 - 3)(16947 + 3)$ $= 3^2$ $= 9$	M1  A1  M1  M1  A1
3	a) cost price $\rightarrow$ 100% original selling price $\rightarrow$ 120% Discounted price $= \frac{80}{100} \times 120\%$ $= 96\%$  b) $100\% - 96\% = 4\%$ loss  c) Let the percentage discount be $d$ $\frac{(100-d)}{100} \times \text{original selling price} \geq \text{cost price}$ $\frac{(100-d)}{100} \times 120 \geq 100$ $(100-d) \geq \frac{100 \times 100}{120}$ $-d \geq 83\frac{1}{3} - 100$ $d \leq 16\frac{2}{3}$ smallest integer discount is <u>16%</u>	M1 A1  A1  M1  A1

4	<p>a) <math>1\text{cm} : 40\text{m} = 1\text{cm} : 4000\text{cm} = 1 : 4000</math></p> <p>b) <math>116 \times \frac{1}{4000} = 0.029\text{m} = 2.9\text{cm}</math></p> <p>c) <math>1\text{cm} : 40\text{m} = 1\text{cm}^2 : 1600\text{m}^2</math>  <math>0.6\text{cm}^2 = 0.6 \times 1600\text{m}^2 = 960\text{m}^2</math></p> <p>d) 9:5</p>	<p>A1</p> <p>A1</p> <p>M1 A1</p> <p>A1</p>
5	<p>a) <math>\text{Area} = \frac{1}{2}(3+6)5 = 22.5\text{cm}^2</math></p> <p>b) <math>A = \frac{1}{2}(x+y)h</math>  <math>(x+y)h = 2A</math>  <math>h = \frac{2A}{x+y}</math></p> <p>c) <math>A = \frac{1}{2}(x+y)h</math>  <math>\frac{2A}{h} = x+y</math>  <math>y = \frac{2A}{h} - x</math> or <math>y = \frac{2A - xh}{h}</math></p> <p>d) <math>h = \frac{2(36)}{3+6} = 8</math></p>	<p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>A1</p>
6	<p>a) cost of one shirt <math>\frac{480}{x}</math></p> <p>b) <math>\text{selling price} = \frac{480}{x} + 3</math></p> <p>c) <math>t - \text{shirts sold} \times \text{selling price} = 630</math>  <math>(x-10) \times \left( \frac{480}{x} + 3 \right) = 630</math>  <math>\left( \frac{480}{x} + \frac{3x}{x} \right) = \frac{630}{x-10}</math>  <math>(x-10)(480+3x) = 630x</math>  <math>x^2 - 60x - 1600 = 0</math> (shown)</p> <p>d) <math>(x-80)(x+20) = 0</math>  <math>x = -20</math> (rejected)    <math>x = 80</math> (accepted)</p>	<p>A1</p> <p>A1</p> <p>M2</p> <p>M1</p> <p>A1</p>

7	<p>a) <math>\angle GEF = \angle ZXY = 86^\circ</math> (corr. <math>\angle</math> in similar figures)  <math>\angle EFG = 180 - 86 - 35 = 59^\circ</math></p> <p>b) <math>\text{Scale} = \frac{\text{image}}{\text{object}} = \frac{6}{9} = \frac{2}{3}</math></p> <p>c) YX correspond to EF  <math>YX = EF \times \frac{2}{3} = 6 \times \frac{2}{3} = 4</math></p>	M1 A1  A1
8	<p>a) Inverse proportion  <math>k = 5 \times 4 = 8 \times \text{Days} \rightarrow \text{Days} = 2.5</math></p> <p>b) <math>5 \times 4 = 20</math> man days needed  <math>5 \times 3 = 15</math> man days completed  <math>4 \times \text{Days} = 5</math> man days left  <math>\text{Days} = 1.25</math>  <math>1.25 - 1 = 0.25</math> or <math>\frac{1}{4}</math> more days needed</p> <p>c) 1 house <math>\rightarrow</math> 20 man days  3 houses <math>\rightarrow</math> 60 man days  <math>2 \times \text{Days} = 60</math>  <math>\text{Days} = 30</math> days needed</p>	A1  M1  A1  M1 A1
9	 <p>b) <math>Q \subset P</math></p> <p>c) <math>\{1, 2, 3, 5, 6, 7, 9, 10\}</math></p> <p>d) 3</p>	B1 correct drawing B1 correct element  A1 A1 A1
10	<p>a) <math>P(\text{white}) = \frac{x}{25+x} = \frac{4}{9}</math>  <math>x = 20</math> white balls</p> <p>b) <math>P(\text{white}) = \frac{20}{25+5+20} = 0.4</math></p>	M1 A1  M1 A1
11	<p>a) 16 to 48 or 32</p> <p>b) Mode = 25</p> <p>c) The data is distributed around 4 clusters at 16, 26, 31 and 45 (or any reasonable description)</p>	A1 A1 A1

12	<p>a) ct Estimated mean = <math>\frac{\text{total.estimated.saving}}{\text{total.students}}</math></p> $= \frac{5(1) + 15(3) + 20(5) + 25(7) + 10(9)}{5 + 15 + 20 + 25 + 10}$ $= \$5.53$ <p>b) <math>5.25 = \frac{\text{new.total.estimated.saving}}{75 + 5}</math></p> <p><i>new.total.estimated.saving</i> = 420  <i>old.total.estimated.saving</i> = 415  → the new 5 students saved \$5  → \$y = \$1  → possible range <math>0 &lt; y \leq 2</math></p>	M1 A1  M1  A1
13	<p>a) <math>\text{Vol} = \text{vol.hemisphere} + \text{vol.cylinder}</math></p> $= \frac{1}{2} \left( \frac{4}{3} \pi 3^3 \right) + (\pi 0.5^2 \times 6)$ $= 19.5\pi$ <p>bi) <math>\text{vol.cone} = \text{vol.sculpture}</math></p> $\frac{1}{3} \pi 3^2 h = 19.5\pi$ $h = 6.5m \text{ (shown)}$ <p>bii) by Pythagoras theorem,  <math>l^2 = 6.5^2 + 3^2</math>  <math>l = 7.158 = 7.16m \text{ (to 3 s.f.)}</math></p>	M2  A1  M1  A1  M1 A1
14	<p>a) <math>x = -2 \quad y = -4</math></p> <p>b) drawn the line of <math>x = 2</math></p> <p>c) 12</p>	A1 A1 A1
15	<p>a) <math>p(\text{cycle}) = \frac{540}{2160} = 0.25</math></p> <p>b) <math>p(\text{not.walk}) = \frac{720 + 540 + 300}{2160} = \frac{13}{18}</math> or 0.722 (to 3 s.f.)</p> <p>c) 5% of 2160 = 108 new students</p> $P(\text{bus}) = \frac{720 + 108}{2160 + 108}$ $= 0.365 \text{ (to 3 s.f.) or } \frac{23}{63}$	A1  A1  M1 A1
16	<p>a) <math>a = -6 \quad b = -4</math></p> <p>b) correctly drawn graph</p> <p>c) <math>y = -4.65</math> to <math>-4.85</math></p> <p>d) <math>x = 0.7</math> or <math>4.3</math></p> <p>e) (2.5, -3.75) accept -3.6 to -3.9</p> <p>f) correctly drawn <math>x = 2.5</math></p>	A2 B3 A1 A2 A1 A1