Name :	Index No :	Class :	Calculator Model
Expected Grade :	Marks Awarded:	Actual Grade :	Parent's Signature:

NORTHLAND SECONDARY SCHOOL
Motivated Learners, Assets to Community
Nurturing Minds, Shaping Character, Strengthening Vigour

FINAL EXAMINATION 2010	
Subject : MATHEMATICS	Paper: 1
Level : Secondary 2 Express	Date: 11 October 2010
Duration : 1 hour 15 minutes	Time : 0740 - 0855
Setter : Ms Yvette Heng	

READ THESE INSTRUCTIONS FIRST

Write your index number and name 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.
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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 of the marks for this paper is 50.

For Examiner's Use

This paper consists of **13** printed pages including the cover page

1. The price of an iPhone dropped from \$498 to \$428. Calculate the percentage drop in price.

Ans: _____% [1]

2.(a) List the following numbers in ascending order.

40%   0.3 $\dfrac{\pi}{9}$ $\dfrac{1}{3}$

[1]

Ans: _____

(b) Express $7\dfrac{1}{2}\%$ as a

(i) decimal,

(ii) fraction, in its simplest form.

Ans: _____ [1]

Ans: _____ [1]

2

3.(a)   Express the following as the products of prime factors.
(i) 198

Ans: _____ [1]

(ii) 90

Ans: _____ [1]

(b)   Use results in (a) to find
(i) the smallest integer, k such that $198k$ is a perfect square.

Ans: _____ [1]

(ii) the highest common factor of 198 and 90.

Ans: _____ [1]

4. Factorise completely:

(a) (i) $4a^2 - 36b^2$

Ans: _____ [2]

(ii) $3ab - 9bc - a^2 + 3ac$

Ans: _____ [2]

(iii) Hence, simplify $\dfrac{4a^2 - 36b^2}{3ab - 9bc - a^2 + 3ac}$

Ans: _____ [2]

5. Solve the following equations.

(a) $\dfrac{3x}{4} = \dfrac{1-x}{12}$

Ans: $x =$ _____ [2]

(b) A right-angled triangle is formed using a piece of wire of length 60 cm. If the shortest side of the triangle is 10 cm and the longest side of the triangle is x cm, find the area of the triangle.

Ans: _____ cm^2 [4]

6. Kavinesh travelled from his house to school which was 81 *km* apart at an average speed of 54 *km/h*.

He then stopped for a 45 *min* rest.

He continued his journey travelling at an average speed of 48 *km/h* and arrived at Sakthis's house 45 *min* later.

Calculate the average speed for the whole journey.

Ans: _____*km/h*   [3]

7. There are N consecutive numbers. The sum S of these numbers is given by the formula $S = \dfrac{N}{2}(2F + N - 1)$ where F is the first number.

(a) Find the sum of 20 consecutive numbers starting at 7.

Ans: _____ [1]

(b) (i) Make F the subject of the formula.

Ans: _____ [1]

(ii) Hence find the first number of a set of 27 consecutive numbers arranged in ascending order, given that the sum is 675.

Ans: _____ [1]

8. If 9 is added to a certain two-digit number, the result is the number with the digits reversed. The sum of the ones digit and the tens digit is 9. What is the number?

Ans: _____ [4]

9. The distance travelled by a car (d) is directly proportional to the square of the amount of petrol consumed (p).

Find the values of a and b in the following table where b is positive.
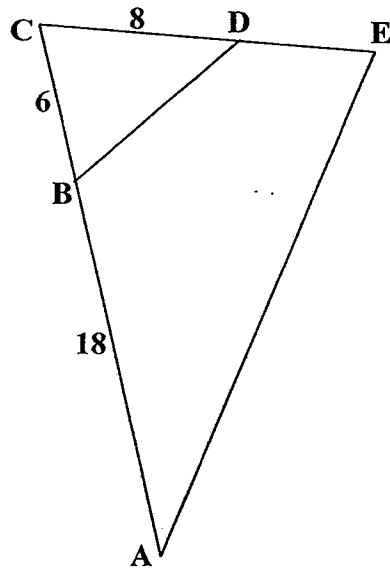
p	5	8	12	b
d	12.5	a	72	162

Ans: $a =$ _____ [2]

Ans: $b =$ _____ [2]

9

10. If 5 men can load a lorry of goods in 5*h*.
    If the time taken to load the lorry is 3*h* 7.5*min*, how many more men are needed to load the lorry?
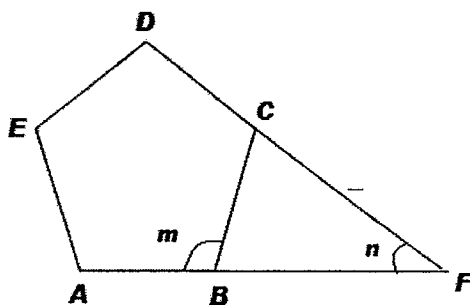
Ans: _____ *men* [2]

11. $\triangle ACE$ and $\triangle DCB$ are similar. Given that AB = 18 *cm*, BC = 6 *cm* and CD = 8 *cm*, calculate DE.

Ans: _____ *cm* [3]

12. In the diagram, ABCDE is a regular pentagon. The sides AB and DC are extended to meet at F such that BF = CF. Find the angles m and n.

Ans: $m =$ _____ ° [2]

Ans: $n =$ _____ ° [2]

13.   A fair die is thrown 50 times and the results are recorded in the table below.

Number on die	1	2	3	4	5	6
Frequency	10	12	7	5	13	3

Find the probability of getting

(a)   An odd number.

(b)   A number not greater than 3.

(c)   A number greater than 2 but less than 6.

Ans: (a) _____ [1]

Ans: (b) _____ [1]

Ans: (c) _____ [1]

14. A map is drawn to a scale of 5 *cm* to 3.5 *km*.

(a) Write the scale in the form 1 : n.

Ans: (a) _____ [1]

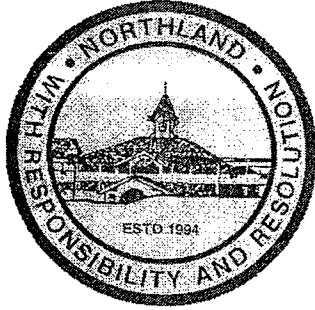(b) Find the actual length of a road in *eentimetres* which measures 7.5cm on the map.

Ans: (b) _____ [1]

(c) Find the area on the map in *square centimetres* with actual area of 2.5*km²*.

Ans: (c) _____ [2]

THE END
Have you checked your work?

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FINAL EXAMINATION 2010 ANSWERS	
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1. The price of an iPhone dropped from \$498 to \$428. Calculate the percentage drop in price.

$$\frac{498 - 428}{498} \times 100\% = 14.1\%$$

Ans: _____14.1_____ % [B1]

2.(a) List the following numbers in ascending order.

40% 0.3 $\dfrac{\pi}{9}$ $\dfrac{1}{3}$

Ans: _____0.3 , $\dfrac{1}{3}$, $\dfrac{\pi}{9}$, 40%_____ [B1]

(b) Express $7\dfrac{1}{2}\%$ as a

(i) decimal,

(ii) fraction, in its simplest form.

(i) $\dfrac{7.5}{100} = 0.075$

(ii) $\dfrac{7.5}{100} = \dfrac{3}{40}$

Ans: _____0.075_____ [B1]

Ans: _____$\dfrac{3}{40}$_____ [B1]

2

3.(a)   Express the following as the products of prime factors.
(i) 198

Ans: ___$2 \times 3^2 \times 11$_____ [B1]

(ii) 90

Ans: ___$2 \times 3^2 \times 5$_____ [B1]

(b)   Use results in (a) to find
(i) the smallest integer, k such that $198k$ is a perfect square.

$198 = 2 \times 3^2 \times 11$

$198k = 2^2 \times 3^2 \times 11^2$

$k = 22$

[B1]

Ans: _____22_____

(ii) the highest common factor of 198 and 90.

HCF = 2×3^2
     = 18

Ans: _____18_____ [B1]

4. Factorise completely:

(a) (i) $4a^2 - 36b^2$

$$4a^2 - 36b^2 = 4(a^2 - 9b^2)$$ [B1]
$$= 4(a - 3b)(a + 3b)$$

Ans: ___$4(a - 3b)(3 + 3b)$___ [B1]/[B2]

(ii) $3ab - 9bc - a^2 + 3ac$

$$3ab - 9bc - a^2 + 3ac = 3b(a - 3c) - a(a - 3c)$$ [M1]
$$= (3b - a)(a - 3c)$$

Ans: ___$(3b - a)(a - 3c)$___ [A1]

(iii) Hence, simplify $\dfrac{4a^2 - 36b^2}{3ab - 9bc - a^2 + 3ac}$

$$\frac{4a^2 - 36b^2}{3ab - 9bc - a^2 + 3ac} = \frac{4(a - 3b)(a + 3b)}{(3b - a)(a - 3c)}$$

$$= \frac{-4(3b - a)(a + 3b)}{(3b - a)(a - 3c)}$$ [M1]

$$= \frac{4(a + 3b)}{(3c - a)} \text{ or } \frac{-4(a + 3b)}{(a - 3c)}$$

Ans: $\dfrac{4(a + 3b)}{(3c - a)}$ [A1]

4

5. Solve the following equations.

(a) $\dfrac{3x}{4} = \dfrac{1-x}{12}$

$36x = 4 - 4x$

$40x = 4$ [M1]

$x = \dfrac{1}{10} \, or \, 0.1$

Ans: $x = \underline{\dfrac{1}{10} \, or \, 0.1}$ [A1]

(b) A right-angled triangle is formed using a piece of wire of length 60 cm. If the shortest side of the triangle is 10 cm and the longest side of the triangle is x cm, find the area of the triangle.

$x^2 = 10^2 + (50-x)^2$ [B1]

$\quad = 100 + 2500 - 100x + x^2$

$100x = 2600$

$x = 26$ [B1]

$height = 60 - 10 - 26$

$\qquad = 24cm$ [B1]

$area = \dfrac{1}{2} \times 10 \times 24$

$\qquad = 120cm^2$

Ans: $\underline{120}$ cm^2 [B1]

5

6. Kavinesh travelled from his house to school which was 81 *km* apart at an average speed of 54 *km/h*.

He then stopped for a 45 *min* rest.

He continued his journey travelling at an average speed of 48 *km/h* and arrived at Sakthis's house 45 *min* later.

Calculate the average speed for the whole journey.

$$D_2 = 48km/h \times \frac{3}{4}h = 36km$$

$$D = 81km + 36km = 117km \qquad \text{[M1]}$$

$$T_1 = \frac{81km}{54km/h} = 1.5h$$

$$T = 1.5h + \frac{3}{4}h + \frac{3}{4}h = 3h \qquad \text{[M1]}$$

$$Average\ Speed = \frac{117}{3} = 39km/h$$

Ans: _____39_____ *km/h* [A1]

7.   There are N consecutive numbers. The sum S of these numbers is given by

the formula $S = \dfrac{N}{2}(2F + N - 1)$ where F is the first number.

(a)   Find the sum of 20 consecutive numbers starting at 7.

$$S = \frac{20}{2}[2(7) + 20 - 1]$$
$$= 10(14 + 19)$$
$$= 330$$

Ans: _____330_____ [B1]

(b)   (i) Make F the subject of the formula.

$$\frac{N}{2}(2F + N - 1) = S$$
$$2F + N - 1 = \frac{2S}{N}$$
$$2F = \frac{2S}{N} - N + 1$$
$$F = \frac{1}{2}\left(\frac{2S}{N} - N + 1\right) \quad or$$
$$= \frac{S}{N} - \frac{N}{2} + \frac{1}{2}$$

Ans: _____$\dfrac{1}{2}\left(\dfrac{2S}{N} - N + 1\right)$_____ [B1]

(ii) Hence find the first number of a set of 27 consecutive numbers arranged in ascending order, given that the sum is 675.

$$F = \frac{1}{2}\left(\frac{2(675)}{27} - 27 + 1\right)$$
$$= 12$$

Ans: _____12_____ [B1]

8. If 9 is added to a certain two-digit number, the result is the number with the digits reversed. The sum of the ones digit and the tens digit is 9. What is the number?

let the number be $10x + y$

$10x + y + 9 = 10y + x$ [M1]

$9x - 9y + 9 = 0$

$y = 1 + x$

$x + y = 9$ [M1]

$x + 1 + x = 9$

$2x = 8$

$x = 4$

$y = 5$ } [M1]

Ans: ___45___ [A1]

8

9. The distance travelled by a car (*d*) is directly proportional to the square of the amount of petrol consumed (*p*).

Find the values of *a* and *b* in the following table where *b* is positive.

p	5	8	12	*b*
d	12.5	*a*	72	162

$d = kp^2$

$12.5 = 25k$

$k = 0.5$ [M1]

$a = d$

$\quad = \dfrac{1}{2}(8)^2$

$\quad = 32$

$p = \sqrt{\dfrac{d}{k}}$ or

$b = \sqrt{\dfrac{162}{0.5}}$ [M1]

$\quad = 18$

Ans: *a* = _____32_____   [A1]

Ans: *b* = _____18_____   [A1]

10. If 5 men can load a lorry of goods in 5h.
If the time taken to load the lorry is 3h 7.5min, how many more men are needed to load the lorry?

$M = \dfrac{k}{H}$

$k = 5 \times 5$

$\quad = 25 \quad or$

$M = \dfrac{25}{3\frac{1}{8}}$

$\quad = 8$ [B1]

$8 - 5 = 3$

Ans: __3__   [B1]

11. $\triangle ACE$ and $\triangle DCB$ are similar. Given that AB = 18 cm, BC = 6 cm and CD = 8 cm, calculate DE.

$\dfrac{CD}{CA} = \dfrac{CB}{CE}$

$\dfrac{8}{24} = \dfrac{6}{CE}$ [M1]

$CE = 18cm$ [M1]

$DE = 18 - 8 = 10cm$

Ans: ____10____ cm [A1]

10

12. In the diagram, ABCDE is a regular pentagon. The sides AB and DC are extended to meet at F such that BF = CF. Find the angles m and n.

$$\text{int.}\angle = (5-2) \times 180°$$
$$= 540° \qquad \text{[M1]}$$

$$\angle m = \frac{540°}{5}$$
$$= 108°$$

or
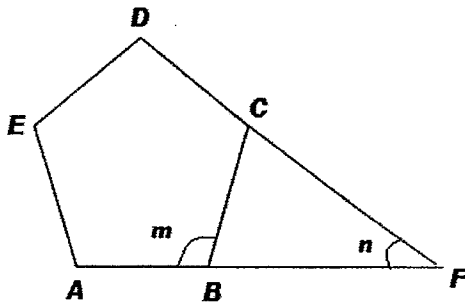
$$ext\angle = \frac{360°}{5}$$
$$= 72°$$

$$m = 180° - 72°$$
$$= 108°$$

$$\angle CBF = 180° - 108° = 72° \qquad \text{[M1]}$$
$$n = \frac{180° - 2(72°)}{2}$$
$$= 18°$$

Ans: $m =$ _____108_____ ° [A1]

Ans: $n =$ _____18_____ ° [A1]

13. A fair die is thrown 50 times and the results are recorded in the table below.

Number on die	1	2	3	4	5	6
Frequency	10	12	7	5	13	3

Find the probability of getting

(a) An odd number.

(b) A number not greater than 3.

(c) A number greater than 2 but less than 6.

$(a) P(odd) = \dfrac{30}{50} = \dfrac{3}{5}$

$(b) P(\leq 3) = \dfrac{29}{50}$

$(c) P(2 < x < 6) = \dfrac{25}{50}$

$= \dfrac{1}{2}$

Ans: (a) $\dfrac{3}{5}$ [B1]

Ans: (b) $\dfrac{29}{50}$ [B1]

Ans: (c) $\dfrac{1}{2}$ [B1]

14. A map is drawn to a scale of 5 *cm* to 3.5 *km*.

(a) Write the scale in the form 1 : n.

$3.5km = 350000cm$

$$\frac{5}{350000} = \frac{1}{70000}$$

Ans: (a) ___1 : 70 000___ [B1]

(b) Find the actual length of a road in *centimetres* which measures 7.5cm on the map.

$$\frac{1}{70000} = \frac{7.5}{x}$$
$x = 525000cm$

Ans: (b) ___525 000___ cm [B1]

(c) Find the area on the map in *square centimetres* with actual area of 2.5km^2.

$2.5km^2 = 25000000000$

$$\left(\frac{1}{70000}\right)^2 = \frac{x}{25000000000}$$

$x = 5.10cm^2$

or $(3.5km)^2 = (5cm)^2$

$12.25km^2 = 25cm^2$

$2.5km^2 = \frac{25}{12.25} \times 2.5 = 5.10cm^2$

[M1]

Ans: (c) ___5.10___ cm^2 [A1]

THE END
Have you checked your work?

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FINAL EXAMINATION 2010

Subject : MATHEMATICS	Paper: 2
Level : Secondary 2 Express	Date: 11 October 2010
Duration : 1 hour 15 minutes	Time : 0900– 1015
Setter : Ms Yvette Heng	

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The total of the marks for this paper is 50.

This paper consists of **7** printed pages including the cover page

Answer all questions.
Write your answers on <u>separate writing paper</u> provided. (50 marks)

1. Answer the whole of this question on a single sheet of <u>**white paper**</u> provided. Showing all your construction lines clearly,

(a) Construct a triangle ABC such that AB = 12 *cm*, AC = 13 *cm* and $\angle ABC = 75°$. [2]

(b) Construct, on your drawing, the

(i) perpendicular bisector of the side BC. [1]

(ii) construct the angle bisector of $\angle BCA$. [1]

(c) Measure and write down the length of AD where D is the point of intersection of the perpendicular bisector and angle bisector in (b). [1]

2. Let $\varepsilon = \{\, x : 2 \le x \le 24 \,\}$,

A = { x : x is a factor of 48} and

B = { x : x is a multiple of 3}.

(a) List the elements of $A \cap B$. [1]

(b) Draw a Venn diagram showing ε, A and B and place the elements in the appropriate part of the diagram. [2]

(c) Shade the set $\left(A \cap B \right) \cup \left(A \cap B' \right)$. [1]

(d) Find n $\left(A \cup B \right)'$. [1]

3. Part of a pattern of numbers is shown in the table below.

1	2	3	...	n
2	5	8	...	a
9	16	25	...	b
2	6	12	...	c
13	27	45	...	d

Study the patterns and find expressions, in terms of n, for each of a, b, c and d in the simplest forms.   [5]

Simplify your expressions whenever possible.

4. The weights of 100 men are recorded in the table below.

(a)

Mass (kg)	Frequency
$54 < x \le 57$	3
$58 < x \le 61$	10
$62 < x \le 65$	22
$66 < x \le 69$	34
$70 < x \le 73$	20
$74 < x \le 77$	11

Calculate the estimated mean weight of the 100 men. [2]

(b) The stem and leaf diagram shows the distribution of the PSLE scores obtained by class 6C in ABC Primary School.

Stem	Leaf							
18	1	1	5	5	8	8	9	
19	2	3	3	3	4	4	8	9
20	0	5	8	8				
21	0	1	5	5	8	8		
22	1	3	4	6	9			

Key: 18 | 1 means 181 points

(i) Find the mean, median and mode of the distribution. [3]

(ii) Given that 20% of the students did not qualify for the Express stream, find the least score needed to qualify for the Express stream. [2]

5. Mdm Goh was trying to make unique mooncakes. She prepared a dough in the shape of a cube of length 20*cm*.
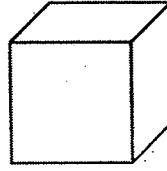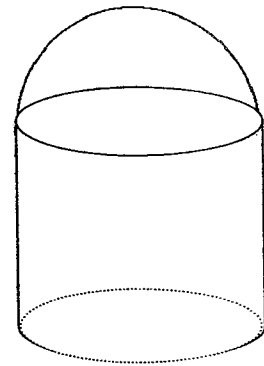
(a) Find the volume of the dough. [1]

(b) She moulded $\frac{3}{4}$ of the cube into a square base pyramid with height 28.8*cm*. [2]

Find the length of the square.
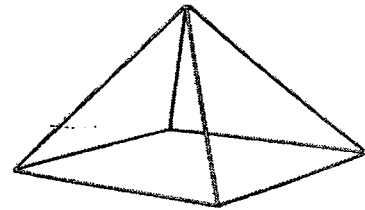
(c) (i) She moulded the rest of the dough into the shape shown on the right. Given that the radius of the hemisphere is 6*cm*.

$$\left\{ \begin{array}{l} \text{Surface Area of Sphere} = 4\pi r^2 \\ \text{Volume of Sphere} = \frac{4}{3}\pi r^3 \end{array} \right\}$$

(i) Find the height of the cylinder. [4]

(ii) Find the total surface area, giving your answer to the nearest whole number. [3]

6. Two typists, Ann and Janna went for an interview.

(a) In one minute, Janna types x lines. [1]

Write down an expression, in terms of x (in seconds), Janna takes to type 1 line.

(b) In one minute, Janna types 2 more lines than Ann.

Write down an expression, in terms of x, for

(i) the number of lines Ann types in one minute. [1]

(ii) the number of seconds Ann takes to type 1 line. [1]

(c) Ann takes 1.5 seconds longer than Janna to type 1 line.

(i) Write down an equation in x to represent this information and show that it [3]
reduces to $x^2 - 2x - 80 = 0$

(ii) Solve the equation $x^2 - 2x - 80 = 0$ [2]

(iii) Find the time taken for Ann to type 30 lines. [2]

Leave your answers in *minutes & seconds*.

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

The table below gives some values of x and the corresponding values of y, where $y = 4 - 3x - x^2$.

x	-6	-5	-4	-3	-2	-1	0	1
y	-14	a	0	4	6	6	4	0

(i) Calculate the value of a. [1]

(ii) Using a scale of 2cm to represent 1 unit on the x-axis and [3]

1cm to represent 1 unit on the y-axis, draw the graph of $y = 4 - 3x - x^2$.

(iii) Use your graph to find

(a) the maximum value of y. [1]

(b) the values of x when $y = 2.2$. [2]

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

- End of Paper -

7

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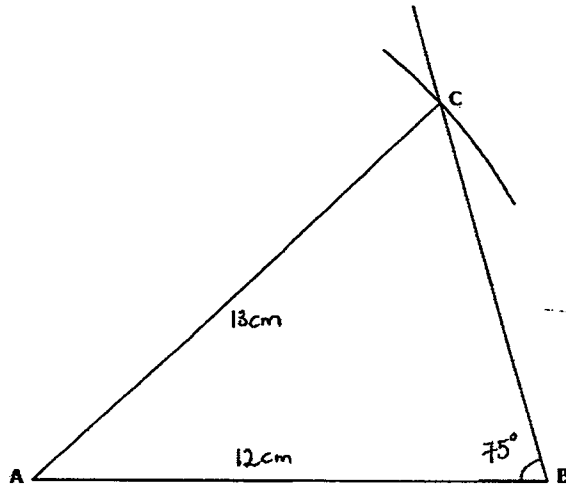The total of the marks for this paper is 50.

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Answer all questions.
Write your answers on separate writing paper provided. (50 marks)

1. Answer the whole of this question on a single sheet of **white paper** provided.
   Showing all your construction lines clearly,

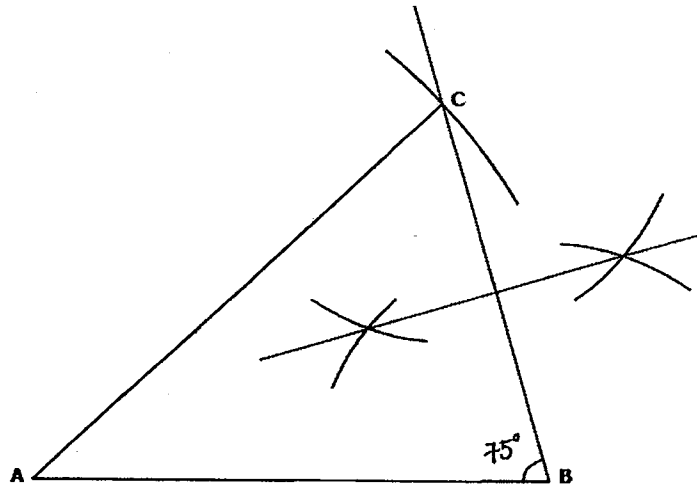(a) Construct a triangle ABC such that AB = 12 *cm*, AC = 13 *cm* and $\angle ABC = 75°$.

[Angle Accurate– B1]

[Length Accurate – B1]

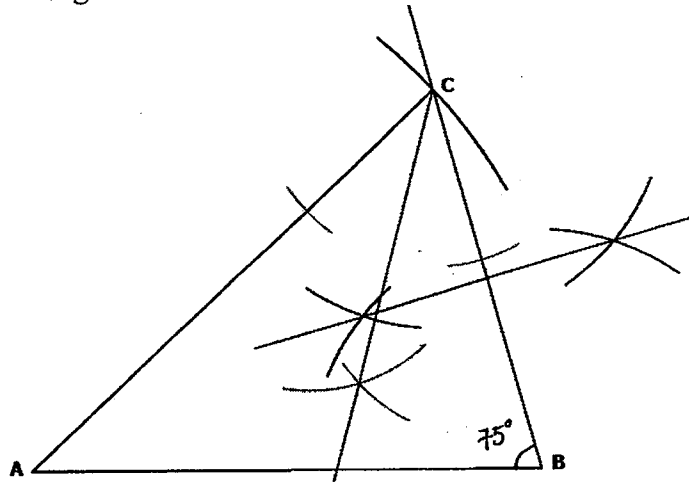(b) Construct, on your drawing, the
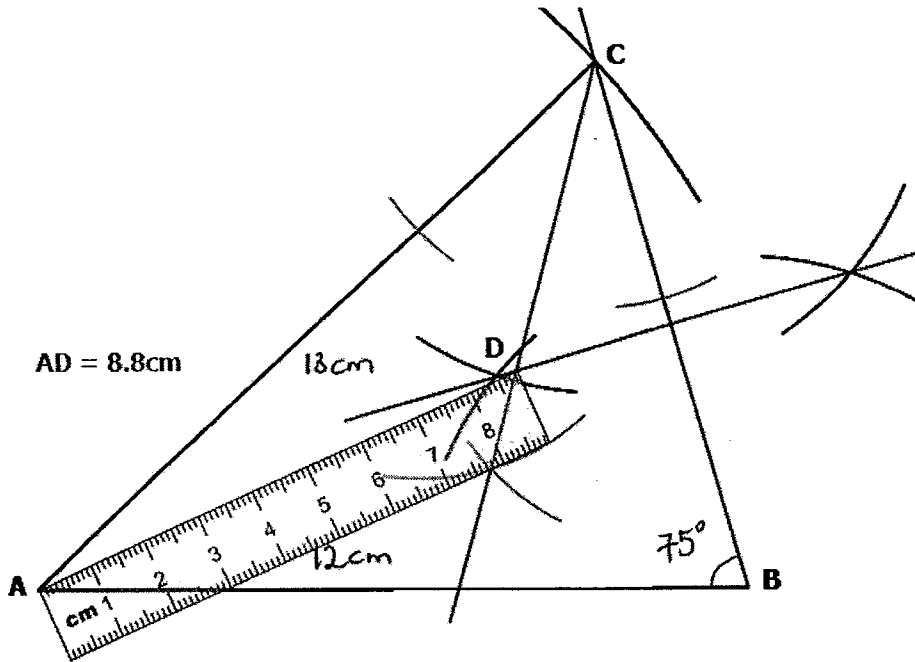
(i) perpendicular bisector of the side BC.

[B1]

(ii) construct the angle bisector of ∠BCA.

[B1]

(c) Measure and write down the length of AD where D is the point of intersection of the perpendicular bisector and angle bisector in (b).

[B1]

AD = 8.8cm

3

2. Let $\varepsilon = \{ x : 2 \le x \le 24 \}$,

   $A = \{ x : x \text{ is a factor of } 48 \}$ and

   $B = \{ x : x \text{ is a multiple of } 3 \}$.

(a) List the elements of $A \cap B$.

   $A \cap B = \{ 3, 6, 12, 24 \}$ [A1]

(b) Draw a Venn diagram showing ε, A and B and place the elements in the appropriate part of the diagram.
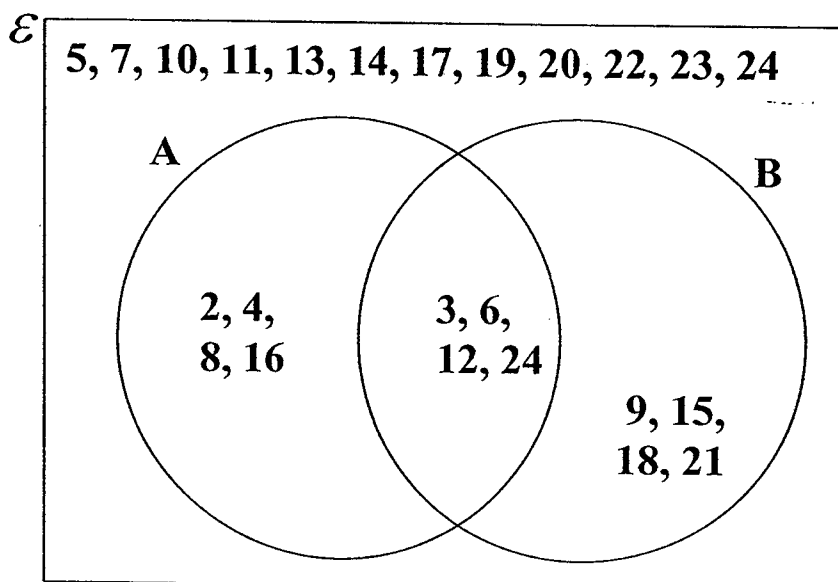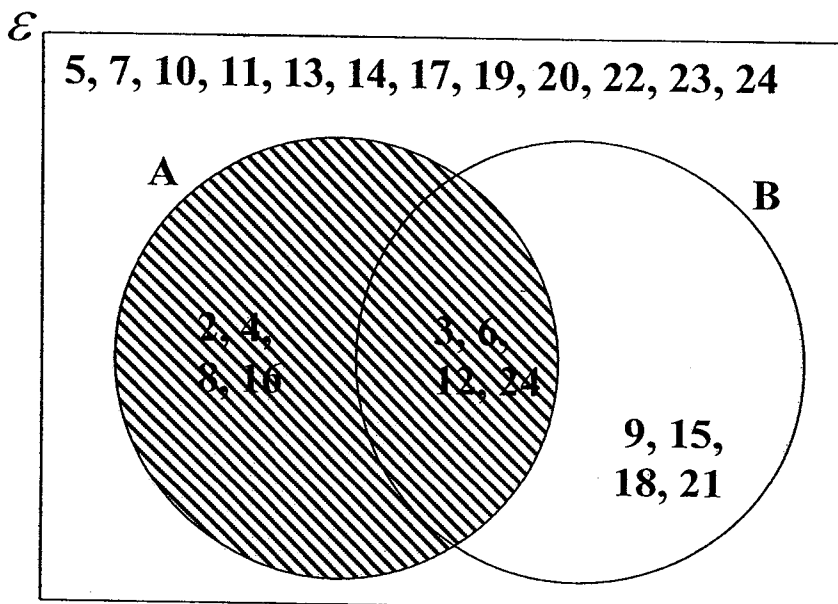

Diagram – [B1]
Elements – [A1]

(c) Shade the set $(A \cap B) \cup (A \cap B')$.

[B1]

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(d) Hence, or otherwise, find $n(A \cup B)'$.

$(A \cup B)' = \{5, 7, 10, 11, 13, 14, 17, 19, 20, 22, 23\}$

$n(A \cup B)' = 11$ [A1]

3. Part of a pattern of numbers is shown in the table below.

1	2	3	$\cdots$	n
2	5	8	$\cdots$	a
9	16	25	$\cdots$	b
2	6	12	$\cdots$	c
13	27	45	$\cdots$	d

Study the patterns and find expressions, in terms of n, for each of a, b, c and d in the simplest forms.

Simplify your expressions whenever possible.   [B1]

$a = 3n - 1$ [B1]

$b = (n + 2)^2$ [B1]

$c = n^2 + n = n(n + 1)$

$d = a + b + c$ or   [M1]

$\quad = 3n - 1 + (n + 2)^2 + n(n + 1)$ [A1]

$\quad = 2n^2 + 8n + 3$

4. The weights of 100 men are recorded in the table below.

(a)

Mass (kg)	Frequency
$54 < x \le 57$	3
$58 < x \le 61$	10
$62 < x \le 65$	22
$66 < x \le 69$	34
$70 < x \le 73$	20
$74 < x \le 77$	11

Calculate the estimated mean weight of the 100 men.

Mass (kg)	Mid-Mass (kg)	Frequency	fx
$54 < x \le 57$	55.5	3	166.5
$58 < x \le 61$	59.5	10	595
$62 < x \le 65$	63.5	22	1397
$66 < x \le 69$	67.5	34	2295
$70 < x \le 73$	71.5	20	1430
$74 < x \le 77$	75.5	11	830.5
Total		100	6714

$$mean = \frac{6714}{100}$$

[M1]

$$= 67.14 kg$$

[A1]

(b) The stem and leaf diagram shows the distribution of the PSLE scores obtained by class 6C in ABC Primary School.

Stem	Leaf
18	1 1 5 5 8 8 9
19	2 3 3 3 4 4 8 9
20	0 5 8 8
21	0 1 5 5 8 8
22	1 3 4 6 9

Key: 18 | 1 means 181 points

(i) Find the mean, median and mode of the distribution.

$$mean = \frac{6084}{30} = 202.8$$ [B1]

median is at 15th & 16th *position*

$$median = \frac{199 + 200}{2} = 199.5$$ [B1]

$$mode = 193$$ [B1]

(ii) Given that 20% of the students did not qualify for the Express stream, find the least score needed to qualify for the Express stream.
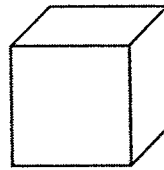
$$20\% \ of \ 30 = 6$$ [M1]

Least score $= 189$ [A1]

5.   Mdm Goh was trying to make unique mooncakes. She prepared a dough in the shape of a cube of length 20*cm*.

(a)   Find the volume of the dough.

$$Volume = 8000cm^3$$ [B1]

(b)   She moulded $\frac{3}{4}$ of the cube into a square base pyramid with height 1.8*cm*.

Find the length of the square.
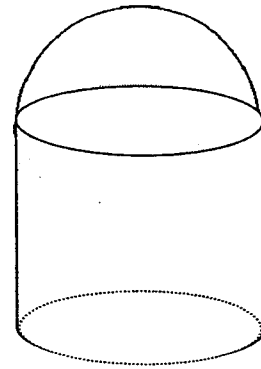
$$\frac{1}{3} \times l^2 \times 28.8 = 6000$$ [M1]

$$l^2 = 625$$

$$l = 25cm$$ [A1]

(c) (i) She moulded the rest of the dough into the shape shown on the right. Given that the radius of the hemisphere is 6cm.

$$\left\{ \begin{array}{l} \text{Surface Area of Sphere} = 4\pi r^2 \\ \text{Volume of Sphere} = \dfrac{4}{3}\pi r^3 \end{array} \right\}$$

(i) Find the height of the cylinder.

$$\frac{2}{3} \times \pi \times r^3 = 452.39 cm^3$$ [M1]

$$\pi r^2 h = 113h$$ [M1]

$$452.39 + 113h = 2000$$ [M1]

$$h = 13.7 cm$$ [A1]

(ii) Find the total surface area, giving your answer to the nearest whole number.

$$hemisphere : 2\pi r^2 = 226.19 cm^2$$ [M1]

$$cylinder : \pi r^2 + 2\pi rh = 113.1 cm^2 + 516.48 cm^2$$

$$= 629.58 cm^2$$ [M1]

$$Total = 226.19 cm^2 + 629.58 cm^2$$

$$= 855.77 cm^2$$ [A1]

6. Two typists, Ann and Janna went for an interview.

(a) In one minute, Janna types x lines.

Write down an expression, in terms of x (in seconds), Janna takes to type 1 line.

$$x \, lines - - - 1 \, min$$

$$1 line - - - - - \frac{1}{x} min$$

$$= \frac{60}{x} s$$ [B1]

8

(b) In one minute, Janna types 2 more lines than Ann.

Write down an expression, in terms of x, for

(i) the number of lines Ann types in one minute.

$(x-2) \, lines \, ---- 1\min$ [B1]

(ii) the number of seconds Ann takes to type 1 line.

$1 line ---- \dfrac{1}{x-2} \min$

$= \dfrac{60}{x-2} s$ [B1]

(c) Ann takes 1.5 seconds longer than Janna to type 1 line.

(i) Write down an equation in x to represent this information and show that it

reduces to $x^2 - 2x - 80 = 0$

$\dfrac{60}{x-2} - \dfrac{60}{x} = 1.5$ [M1]

$60x - 60x + 120 = 1.5x(x-2)$ [M1]

$1.5x^2 - 3x - 120 = 0$ [A1]

$x^2 - 2x - 80 = 0$

(ii) Solve the equation $x^2 - 2x - 80 = 0$

$x^2 - 2x - 80 = 0$

$(x-10)(x+8) = 0$ [M1]

$x = 10 \quad or \quad x = -8$ [A1]

(iii) Find the time taken for Ann to type 30 lines.

Leave your answers in *minutes & seconds*.

$1 line ---- \dfrac{1}{x-2} \min$

$= \dfrac{1}{8} \min$

$30 lines --30 \times \dfrac{1}{8}$

$= 3.75 \min$ [M1]

$= 3\min 45s$ [A1]

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

The table below gives some values of x and the corresponding values of y, where $y = 4 - 3x - x^2$.
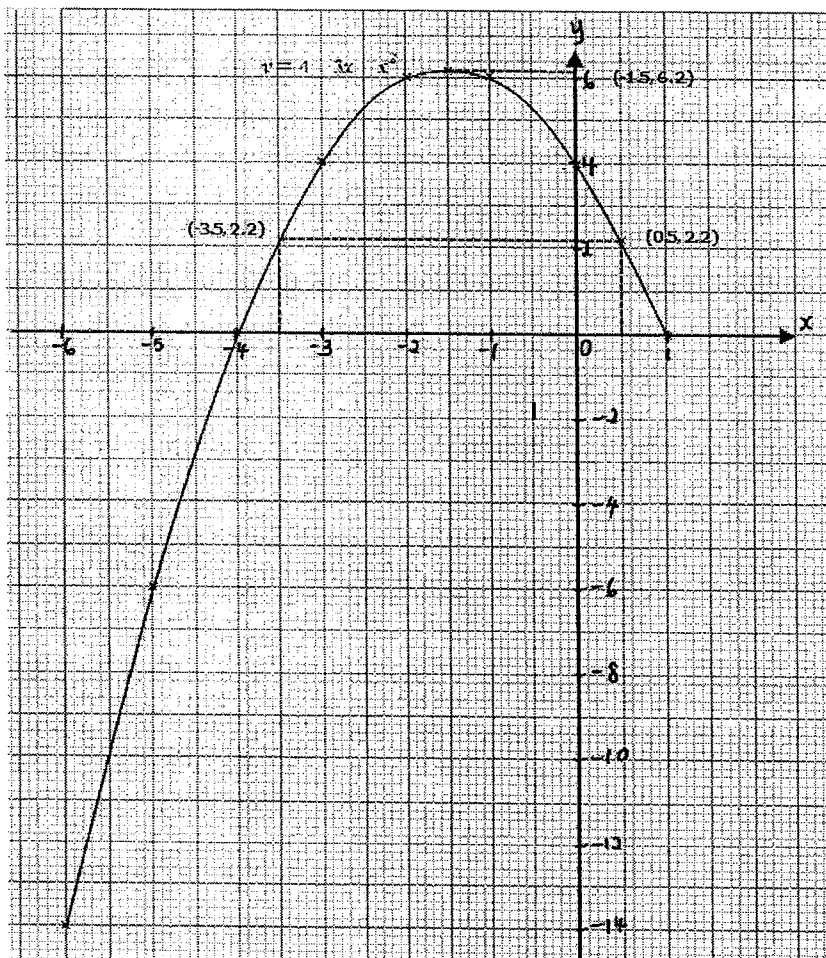
x	-6	-5	-4	-3	-2	-1	0	1
y	-14	a	0	4	6	6	4	0

(i) Calculate the value of a.

$a = 4 - 3(-5) - (-5)^2$

$\quad = -6$

[B1]

(ii) Using a scale of 2cm to represent 1 unit on the x-axis and

1cm to represent 1 unit on the y-axis, draw the graph of $y = 4 - 3x - x^2$.

Scale – [B1]

Points plotted
correctly– [B1]

Smoothness – [C1]

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(iii)   Use your graph to find

(a) the maximum value of y.

$y = 6.2 \sim 6.4$ [B1]

(b) the values of x when $y = 2.2$.

$x = -3.5$ or $x = 0.5$ [B2]

(c) the equation of the line of symmetry of the curve.

$x = -1.5$ — [B1]

- End of Paper -