EPPING BOYS' HIGH SCHOOL

YEAR 10 YEARLY EXAMINATION 2007

MATHEMATICS
Stage 5.1 – 5.3

Time allowed: 65 minutes

Name: _____

Class: <u>10</u>M _____
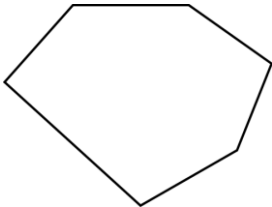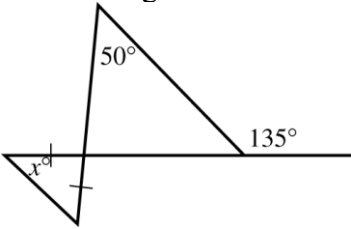
Teacher: _____

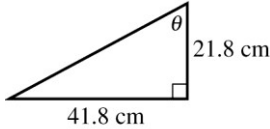**DIRECTIONS TO CANDIDATES:**

♦ **ALL** questions must be attempted.
♦ Figures are not necessarily drawn to scale.
♦ Full marks may not be awarded for careless or badly arranged work.
♦ Approved calculators may be used.

SECTION 1 Multiple Choice Questions	SECTION 2 Short Answer Questions	SECTION 3 Short Answer Questions		TOTAL
/30	/50	/20		/100
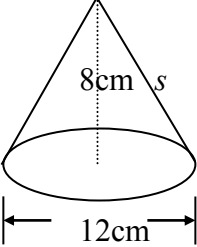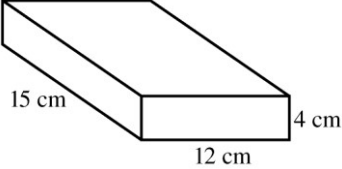
SECTION 1 - Multiple choice Questions

Write your answers in the *Answers* column.

	Questions (two marks each)	Answers
01	What is $\dfrac{6.2}{\sqrt{7.29}+5.1}$ correct to 1 decimal place equal to? A 0.5　　　B 0.8　　　C 6.0　　　D 7.4	
02	Michelle's car has a fuel economy of 8.5 L/100 km. Michelle's fuel tank has a capacity of 55 L. The maximum distance that Michelle can travel on a full tank of fuel is: A 467.5 km　B 647 km　C 15.45 km　D 850 km	
03	The answer to $4p^0$ is: A $4p$　B 4　　C 41　D $4+p$	
04	The answer to $\dfrac{(3.2\times10^4)\times(1.5\times10^2)}{2.4\times10^3}$ is: A 2×10^3　B 4.8×10^3　　C 2×10^9　D 4.8×10^9	
05	In the diagram shown the sum of the interior angles is equal to: A 540　　　B 720　　　C 900　　　D 1080	
06	The value of $x°$ in the figure shown is: A 45°　　　B 47.5°　　C 85°　　　D 95°	
07	The expression $\dfrac{2x}{5}-\dfrac{3x}{4}$ is simplified to: A $-\dfrac{x}{20}$　B $-\dfrac{x}{1}$　C $-\dfrac{7x}{20}$　D $\dfrac{6x^2}{20}$	

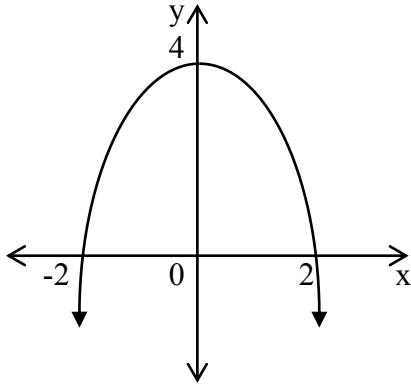| 08	The solution to the inequality $4(2-x)>16$ is: A $x>2$ B $x>-4$ C $x<-2$ D $x>-2$	
09	Rearrange the formula $\dfrac{x+2y}{3}=q$, so that y is the subject. A $y=3q-x$ B $y=3q-0.5x$ C $y=1.5q-x$ D $y=1.5q-0.5x$	
10	$-\sqrt{5}\left(3\sqrt{10}-2\sqrt{20}\right)$ is equal to: A $-3\sqrt{50}+10$ B $-3\sqrt{50}-10$ C $20-15\sqrt{2}$ D $-15\sqrt{2}-20$	
11	 41.8 cm 21.8 cm The value of θ accurate to the nearest degree is: A $59°$ B $47°$ C $31°$ D $62°$	
12	The gradient of the line parallel to $3x+11y-2=0$ is: A $\dfrac{3}{11}$ B $-\dfrac{3}{11}$ C $\dfrac{11}{3}$ D $-\dfrac{11}{3}$	
13	The digits 2, 4, and 7 are arranged to form a three digit number. The probability that the number formed is even is: A $\dfrac{1}{3}$ B $\dfrac{1}{2}$ C $\dfrac{2}{3}$ D $\dfrac{4}{9}$	
14	The solutions to $(3x+2)(5x-4)=0$ are: A $x=-2, x=4$ B $x=\dfrac{2}{3}, x=\dfrac{4}{5}$ C $x=-\dfrac{2}{3}, x=\dfrac{4}{5}$ D $x=\dfrac{2}{3}, x=-\dfrac{4}{5}$	
15	The solution to the following pair of simultaneous equations is: $3x-y=18$ $4x+y=10$ A $(5, -3)$ B $(-3, 5)$ C $(4, -6)$ D $(4, 6)$	

SECTION 2 - Short Answer Questions
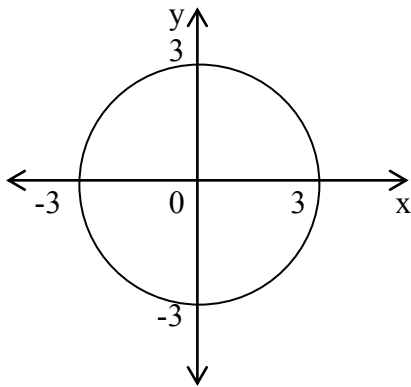
Write your answers in the *Answers* column.

	Questions (two marks each)	Answers
01	Solve : $x^2 + 4x - 6 = 0$ Leave the answers in surd form.	
02	Yani borrowed $12 500 from the bank to buy a car. Simple interest is charged on the loan at a rate of 8.5% per annum over 5 years. How much **interest** did Yani pay?	
03	If the population of Uraniumgong is decreasing by 20% of its population every year. What would be the population in three years if it is now 7000?	
04	The point $(-1, 5)$ is the midpoint of the segment AB. If A has coordinates (w, v) and B has coordinates $(4, 7)$ find w and v.	
05	For the following parabola $y = 4x^2 - 4x - 3$ Find (a) the y-intercept (b) the x-intercepts (c) the equation of the axis of symmetry (d) the coordinates of the vertex	(a) (b) (c) (d)
06	A cone has a diameter of 12 cm and a height of 8 cm. 8cm *s* 12cm Find: (a) the slant height s (b) the total surface area of the cone, to two decimal places. (c) the volume of the cone, correct to 2 decimal places.	(a) (b) (c)
07	Find the surface area of the box whose dimensions are shown in the figure below. 15 cm 4 cm 12 cm	

4

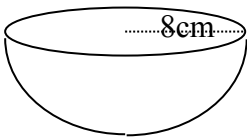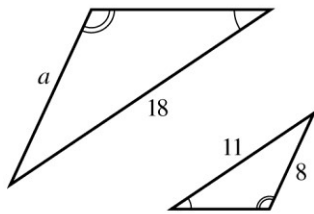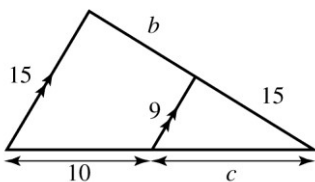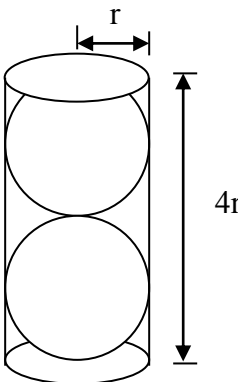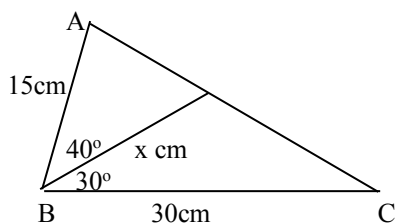| 08	Determine the equation of each graph. (a) (b) 	(a) (b)
09	Find the surface area of the following closed hemisphere, correct to 2 decimal places. 	
10	Find the value of the pronumeral a in the pair of similar triangles. 	
11	Find the value of the pronumerals b and c in the figure below. 	

12	The ratio of the volume of two similar prisms, A and B, is 27 : 8. If the surface area of prism A is 45 cm², find the surface area of prism B.	
13	Two 6-sided dice are tossed simultaneously. What is the probability of the total being equal to 9?	
14	The following is the menu at the new restaurant Le Café Japone. Menu **Entrees** - Soup de Jour - Oysters Unnatural - Cape Bridgett **Main Courses** - Sushi de Mer - Chicken a la Teriyaki - Ginger Pork cutlets **Desserts** - Peach Melba - Fried Ice-cream (a) How many different combinations of meals are possible if you select one item from each section of the menu? (b) How many different combinations of meals can you order if Peach Melba is included? (c) Find the probability that if a random order of a combination was made it would include Peach Melba.	(a) (b) (c)
15	If θ is an angle between 0º and 180º, find θ to the nearest degree if : (a) $\sin \theta = 0.5$ (b) $\cos \theta = -0.5$	(a) (b)
16	Find x in the following triangle, correct to one decimal place. 9cm x cm 37º 12cm	

SECTION 3 - Short Answer Questions

Write your answers in the *Answers* column.

	Questions (two marks each, if not stated)	Answers
01	The following data shows the weight in kg of a group of students 55 56 57 54 53 54 59 58 56 54 56 52 55 58 54 (a) Display the results in a frequency table. Use the frequency table to find: (b) the mean weight of the students. (1 mark) (c) the mode weight of the students. (1 mark) (d) the median weight of the students. (1 mark)	(a) <table><tr><th>Score</th><th>Freq</th><th>$f \times x$</th><th>cf</th></tr><tr><td>52</td><td></td><td></td><td></td></tr><tr><td>53</td><td></td><td></td><td></td></tr><tr><td>54</td><td></td><td></td><td></td></tr><tr><td>55</td><td></td><td></td><td></td></tr><tr><td>56</td><td></td><td></td><td></td></tr><tr><td>57</td><td></td><td></td><td></td></tr><tr><td>58</td><td></td><td></td><td></td></tr><tr><td>59</td><td></td><td></td><td></td></tr></table>$\Sigma f =$ $\Sigma(f \times x) =$ (b) (c) (d)
02	Two solid spherical balls are inscribed in a cylinder which has a radius of r cm and a height of $4r$ cm, as shown in the following diagram. (a) Find the volume of the cylinder in terms of π and r (b) Show that the volume of the unused space in the cylinder is equal to the volume of the ball.	(a) (b)
03	Solve the simultaneous equations. $y = x^2$ $y = -4x - 3$	

04	For the following triangles	(a)

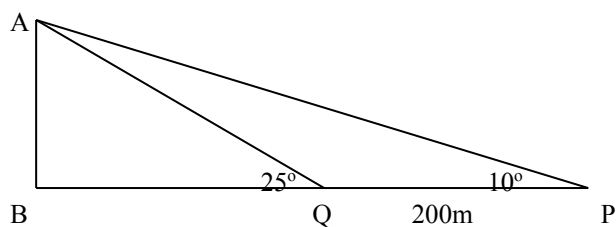**04** For the following triangles

A

15cm

40° x cm

30°

B   30cm   C

(a) Find the area of the triangle ABC, correct to 2 decimal places.

(b) Hence, find the value of x, correct to 2 decimal places.
(Hint: the sum of the areas of two smaller triangles is equal to the area of the large triangle)

(a)

(b)

05

A

25°   10°

B   Q   200m   P

From position P, Taro finds that the angle of elevation of the top A of a tree AB is 10°. After walking 200 metres directly towards the tree to the point Q, he finds that the angle of elevation of A is 25°.

(a) Find ∠QAP. (1 mark)
(b) Use the sine rule to calculate the length of QA to the nearest metre.
(c) Find the height of the tree AB to the nearest metre.

(a)

(b)

(c)

END OF PAPER
(Check your answers)

YEAR 10 YEARLY EXAMINATION 2007
Solutions

SECTION 1 - Multiple choice Questions

01 B
02 B
03 B
04 A
05 B
06 B
07 C
08 C
09 D
10 C
11 D
12 B
13 C
14 C
15 C

SECTION 2 - Short Answer Questions

01
$x = -2 + \sqrt{10}$ and $x = -2 - \sqrt{10}$

02 $I = PRT$
$\quad = \$12\,500 \times 0.085 \times 5$
$\quad = \$5312.50$

03 $P = 7000 \times (1 - 0.2)^3 = 3584$

04 $-1 = \dfrac{w+4}{2}, w = -6, -5 = \dfrac{v+7}{2}, v = 3$
$\quad w = -6$ and $v = 3$

05(a) (0, -3)

(b) $(-\dfrac{1}{2}, 0), (1\dfrac{1}{2}, 0)$

(c) $x = \dfrac{1}{2}$

(d) $(\dfrac{1}{2}, -4)$

06(a)
$s^2 = 8^2 + 6^2$
$\quad s = 10 cm$

(b)
$SA = \pi r^2 + \pi r s = \pi \times 6^2 + \pi \times 6 \times 10 =$ 301.59cm^2

(c)
$V = \dfrac{1}{3}\pi r^2 h = \dfrac{1}{3} \times \pi \times 6^2 \times 8 = $ 301.59cm^3

07 $SA = 2(lb + lh + bh)$
$\quad = 2 \times (15 \times 12 + 15 \times 4 + 12 \times 4)$
$\quad = 2 \times (180 + 60 + 48)$
$\quad = 2 \times 288$
$\quad = 576$ cm^2

08 (a) $y = -x^2 + 4$

(b) $x^2 + y^2 = 9$

09 $SA = \dfrac{1}{2}$ sphere + circle

$\quad = \dfrac{1}{2} \times 4\pi r^2 + \pi r^2$

$\quad = \dfrac{1}{2} \times 4 \times \pi \times 8^2 + \pi \times 8^2$

$\quad = 603.19$ cm^2

10
$\dfrac{a}{8} = \dfrac{18}{11}$

$a = \dfrac{18}{11} \times 8$

$a = 13\dfrac{1}{11}$

11
$\dfrac{b+15}{15} = \dfrac{15}{9}$
$\quad\quad b = 10$
$\dfrac{c+10}{15} = \dfrac{c}{9}$
$\quad\quad c = 15$

12 Ratio of volume, A : B = 27 : 8
$\therefore$ ratio side length, A : B = 3 : 2
$\therefore$ ratio surface area, A : B = 9 : 4
$\therefore$ Surface area B = 45 ÷ 9 × 4 $\quad$ = 20 cm^2

13 There are 36 possible outcomes
{(1, 1), (1, 2),…(6,6)}.
Those whose total is 9:
(3, 6), (4, 5), (5, 4), (6, 3).
P(total equals 9) = $\dfrac{4}{36} = \dfrac{1}{9}$

14 (a) 3x3x2=18
(b) 3x3x1=9
(c) $\dfrac{9}{18} = \dfrac{1}{2}$

15 (a) $30°$ or $150°$
(b) $120°$

16 $x^2 = 12^2 + 9^2 - 2 \times 12 \times 9 \times \cos 37$
$\quad$ x = 7.2 cm

SECTION 3 - Short Answer Questions

01

(a)

Score	Freq	$f \times x$	cf
52	1	52	1
53	1	53	2
54	4	216	6
55	2	110	8
56	3	168	11
57	1	57	12
58	2	116	14
59	1	59	15

$$\Sigma f = 15 \quad \Sigma(f \times x) = 831$$

(b) $\quad \bar{x} = \dfrac{\Sigma f \times x}{\Sigma f} = \dfrac{831}{15} = 55.4$

(c) Mode = $\underline{54}$

(d) Median = 8th score $\quad$ = $\underline{55}$

02(a)

$$V_{\text{cylinder}} = \pi r^2 h = \pi r^2 \times 4r = 4\pi r^3 \text{ cm}^3$$

(b)

$$V_{\text{sphere}} = \frac{4}{3}\pi r^3 \text{ cm}^3$$

Unused space = $V_{\text{cylinder}} - 2 \, x \, V_{\text{sphere}}$

$$= 4\pi r^3 - 2 \times \frac{4}{3}\pi r^3 = \frac{4}{3}\pi r^3 \text{ cm}^3$$

Therefore, the volume of the unused space in the cylinder is equal to the volume of the ball.

03 Equating the equatins

$$x^2 = -4x - 3$$
$$(x+1)(x+3) = 0$$

$x = -1 \quad$ or $\quad x = -3$
$\underline{y = 1} \qquad\qquad \underline{y = 9}$

04 (a)

$$A = \frac{1}{2} \times 15 \times 30 \times \sin 70$$
$$= \underline{211.43 \text{ cm}^2}$$

(b)

$$(\frac{1}{2} \times 15x \times \sin 40) + (\frac{1}{2} \times 30x \times \sin 30) = \frac{1}{2} \times 15 \times 30 \times \sin 70$$

$$x = \frac{450 \sin 70}{15 \sin 40 + 30 \sin 30}$$

$$x = \underline{17.16 \text{ cm}}$$

05(a)

$\angle QAP = 25^\circ - 10^\circ = \underline{15^\circ}$

(b)

$$\frac{QA}{\sin 10^o} = \frac{200}{\sin 15^o}$$

$\underline{QA = 134 \text{ m}}$

(c)

$$\frac{AB}{QA} = \sin 25^o$$

$AB = 134 \sin 25^\circ$
$\underline{AB = 57m}$

END OF PAPER
(Check your answers)

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