EPPING BOYS' HIGH SCHOOL

YEAR 11 YEARLY EXAMINATION 2006

GENERAL MATHEMATICS

Name: _____

Class: _____

Teacher: _____

Time Allowed: 2 hours

Directions to Candidates

SECTION 1 (20 marks)

- This section contains 20 multiple choice questions. Allow 30 minutes.
- Attempt ALL questions.
- **Mark** your answers on the Answer Sheet Attached.

SECTION 2 (60 marks)

- This section contains 5 questions of equal value. Allow 1½ hours.
- Attempt ALL questions.
- Writing booklets will be provided. You may ask for extra Writing Booklets if you need them.
- **Start each question on a new page.**
- All necessary working should be shown in this section.
- Marks may be deducted for careless or badly arranged work.
- Board approved calculators may be used.
- Please detach formula sheet from back of exam paper

Question	Section 1	Section 2						
		Q21	Q22	Q23	Q24	Q25	Total	%
Full Marks	20	12	12	12	12	12	80	100
Score								

SECTION 1

Questions 1-20 are multiple choice worth 1 mark each. Allow about 30 minutes for this section.

1. Given that $v = u + at$ and $v = 11.6$ when $u = 6.5$ and $a = 3.7$, the value of t (to 3 significant figures is:

   A 1.378

   B 1.37

   C 1.38

   D 1.40

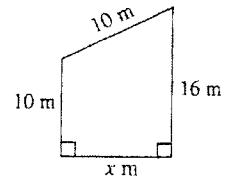
2. In the diagram, x is equal to:

   A 10

   B 8

   C 6

   D 4



3. At a sale James bought a pair of shoes for \$100. The price before the sale was \$125. The sale price represents a saving of approximately:

   A 20%

   B 25%

   C 28%

   D 30%

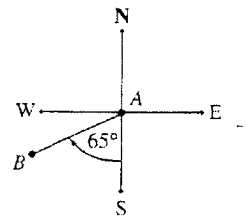
4. In the given diagram, the true bearing of B from A is:

   A 065^0T

   B 245^0T

   C 205^0T

   D 565^0W



5. Simplify $4 - (x - 2)$.

   A $2 - x$

   B $4x - 8$

   C $4x + 8$

   D $6 - x$

6. The discounted price of a stereo is $650. The discount allowed was 12% of the original price. What was the original price of the stereo correct to the nearest dollar?

A $78

B $87

C $728

D $739

7. In 1986 Halley's Comet came close to Earth. At the closet point it was 89 million kilometres from the sun. In scientific notation, 89 million is:

A 8.9×10^5

B 8.9×10^6

C 8.9×10^7

D 8.9×10^8

8. Here is a student's solution to an equation:

$\frac{x+7}{x} = 20$ line 1

$x + 7 = 20x$ line 2

$7 = 19x$ line 3

$x = \frac{19}{7}$ line 4

Which of the following is true?

A There is an error in line 2.

B There is an error in line 3.

C There is an error in line 4.

D There is no error in this solution.

9. The mass of 1 atom of a substance is 7.22×10^{-24}g. Calculate the number of atoms in 170g of this substance, expressing your answer in scientific notation.

A 2.35×10^{25}

B 1.23×10^{-2}

C 8.664×10^{27}

D 4.25×10^{-25}

10. Chloe invested $1500 for 4 years. At the end of this period she had $2088. The correct way to calculate the simple interest rate per annum as a percentage is:

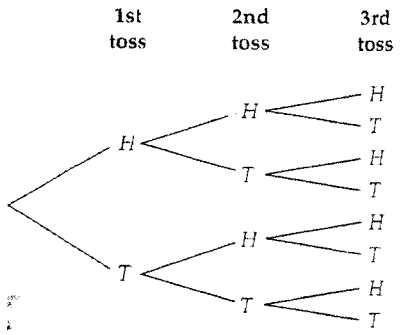
A $\dfrac{100 \times 208}{1500 \times 4}$

B $\dfrac{588 \times 100}{1500 \times 4}$

C $\dfrac{588 \times 100}{2088 \times 4}$

D $\dfrac{1500 \times 4}{588 \times 100}$

11. The following tree diagram represents the possible outcomes when a coin is tossed 3 times.



Find the probability of the results being 2 heads and 1 tail in any order.

A $\dfrac{1}{2}$

B $\dfrac{1}{8}$

C $\dfrac{5}{8}$

D $\dfrac{3}{8}$

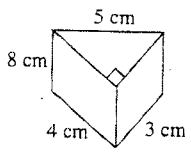
12. The volume of the given triangular prism is:

A 48 cm^3

B 60 cm^3

C 80 cm^3

D 96 cm^3



13. Solve $2(3x + 4) - 5x = 20$.

A 12

B 16

C -6

D 2

14. The average weight of 5 boys is 70 kg and the average weight of 4 girls is 61 kg. The average weight of the 9 children is:

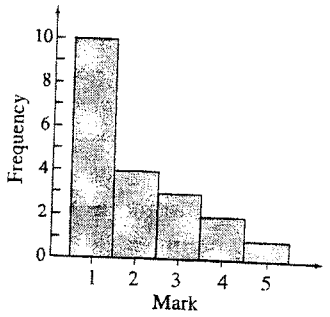
A 65.0 kg

B 65.5 kg

C 66.0 kg

D 67.0 kg

15. The following graph shows the marks gained by each person in a class test. What is the mean mark?



A 1

B 2

C 3

D 4

16. Which of the following is a linear equation?

A $y = x^2 + 7$

B $y = 5 - \frac{7}{x}$

C $y = 6 - 7x$

D $y = \sqrt{x - 3}$

17. Find the value of a correct to 1 decimal place, given that $a^2 = 8^2 + 9^2 - 2 \times 8 \times 9 \cos 85^0$.

A 11.5

B 132.4

C 7.8

D 12.3

18. $2000 invested for 2 years at 10% p.a. compound interest becomes:

A $2400

B $2420

C $2666

D $5000

19. The radius of Earth is approximately 6400 km. What is the circumference of Earth, at the Equator, to the nearest kilometre?

A 40 212 km

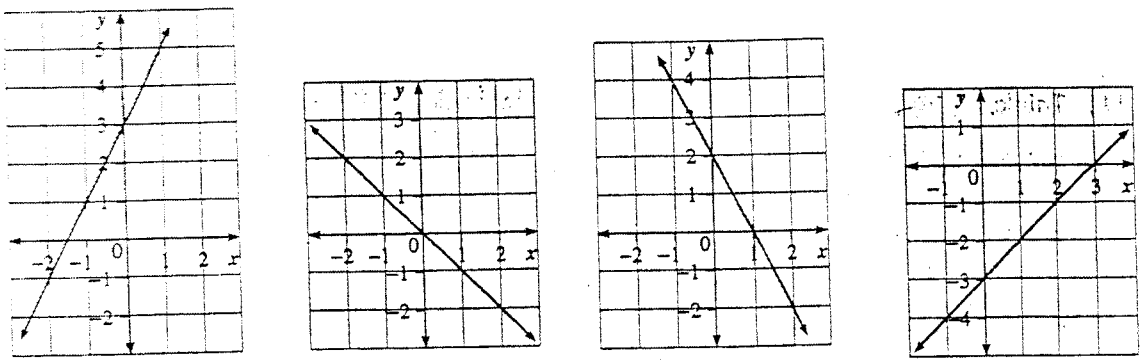
B 1.29×10^8 km

C 20 106 km

D 38 340 km

20. Which of the following graphs has a negative gradient and a positive y intercept? (Write your answer as A, B, C or D)

(A) (B) (C) (D)



SECTION II

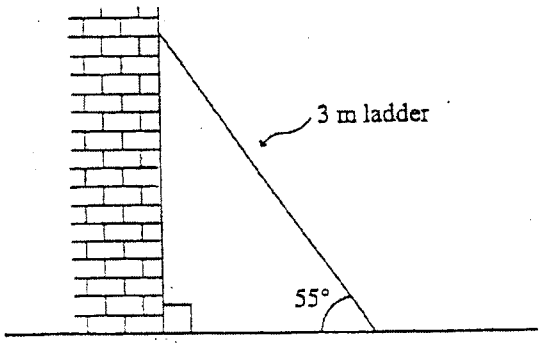
- Attempt Questions.
- Show all working.
- Start each question on a new page.
- Each question is worth 12 marks.

Question 21

MARKS

a) Convert the speed of light, 3×10^5 km/s, to metre per second. 2

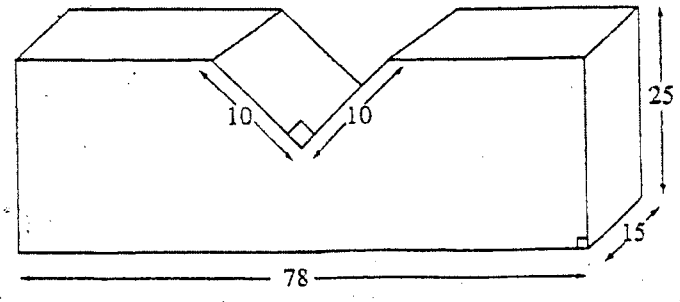
b) A 3 metre ladder rests against a vertical wall, making an angle of 55^0 with the horizontal. 2



NOT TO SCALE

How far up the wall does the ladder reach? Give your answer correct to the nearest centimetre.

c) A solid metal support with a right-angled groove is shown below. 2
All measurements are in centimetres.



NOT TO SCALE

Calculate the volume of the metal support.

d) Chris' rule to convert temperature in degrees Celcius (C) to degrees Fahrenheit (F) is:

"double the temperature in degrees Celsius and add thirty"

Write Chris' rule as an algebraic expression for F in terms of C. 1

e) Joern buys 2400 Texcal shares at $2.40 each with a dividend yield of 6.1%. Brokerage is 2% of the purchase price while stamp duty is 15 cents per $100 or part thereof. Calculate:

(i) The cost of purchasing the shares (including brokerage and stamp duty). 2

(ii) Joern's dividend. 1

f) Solve the equation $\frac{3x-2}{5} = \frac{4-x}{3}$ 2

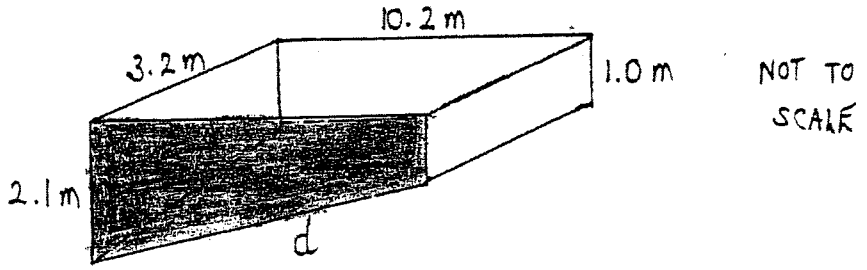
Question 22 - Start a new page

MARKS

a) From the top of a lighthouse 24 metres high, the angle of depression to a boat at sea is 12^0. 2

How far is the boat from the base of the lighthouse (the base of the lighthouse is at sea-level)? Answer to the nearest metre. (You must draw a diagram).

b) The diagram shows a backyard swimming pool 10.2 metres long and 3.2 metres wide. The pool's depth ranges from 1.0 metres to 2.1 metres.



(i) Show the *d*, the length of pool's floor is 10.3 m (correct to one decimal place). 1

(ii) Calculate the area of the shaded wall. 2

(iii) The four walls and the floor of the pool are to be resurfaced with Pebblecrete. If Pebblecrete costs \$54 per square metre, calculate the cost of resurfacing the pool. 2

c) Ubeat Constructions Ltd is laying a concrete floor 32 metres long and 12 metres wide. The length of the floor on the plan is 96 cm.

(i) What is the scale factor of the plan? 1

(ii) What is the width of the floor on the plan? 1

d) The table below shows the Weekly Gross Pay (W) for employees of Tim's scooter company. It uses the employee's Pay Rate (R), Normal Hours (N) worked and the number of Overtime Hours (V) worked for the week. Overtime is paid at time-and-a-half.

WEEKLY WAGES				
Name	**Pay Rate**	**Normal Hours**	**Overtime Hours**	**Weekly Gross Pay**
	(R)	(N)	(V)	(W)
Mi	\$9.50	40	2	\$408.50
Tim	\$9.50	35	3	
Mary	\$11.30	35		\$412.45

(i) Calculate Tim's Weekly Gross Pay. 1

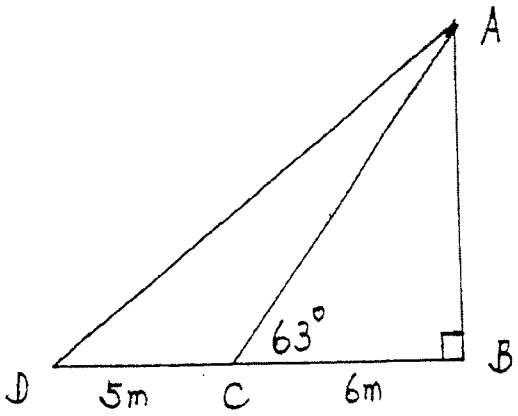
(ii) How many Overtime Hours did Mary work? 1

(iii) Write a formula for W, in terms of R, N and V. ie. a formula that could work out the Weekly Gross Pay (W) for any values of R, N and V. 1

QUESTION 23 - Start a new page

MARKS

a) At a distance of 6 metres, point C, from the base of a building (B) the angle of elevation of the top of the building (A) is 63^0. Point D is 5 metres further out from C.

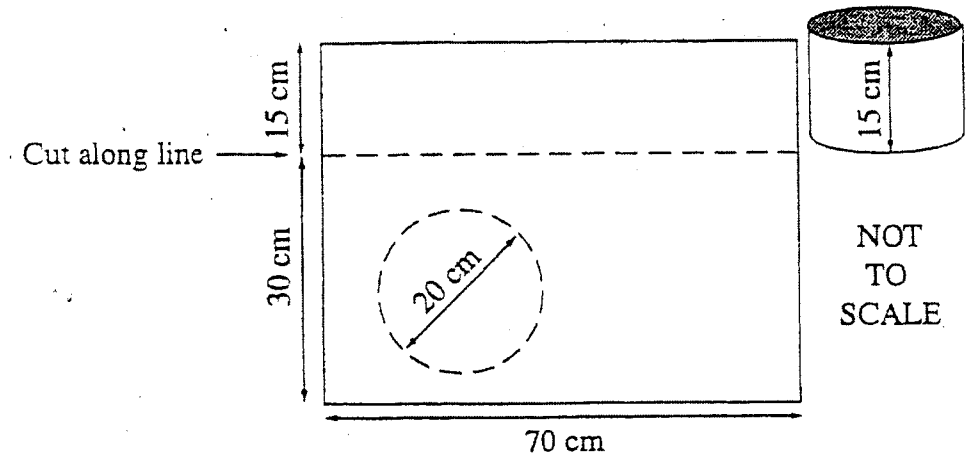


NOT TO SCALE

(i) Find the height AB of the building (to the nearest 10cm). 2

(ii) Find the angle of elevation from Point D to the top of the building (Point A). (Answer to the nearest degree). 2

b) A rectangular piece of metal 70 cm by 45 cm is cut to make the circular base and the side of an open cylinder, as shown:



NOT TO SCALE

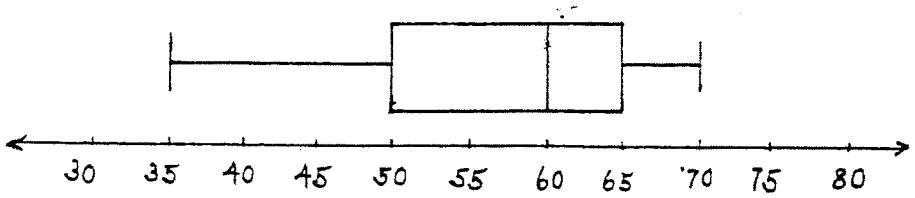
(i) The strip of width 15 cm must be trimmed to fit around the base of diameter 20 cm, with no overlap. 2
Calculate the length of the strip required, to the nearest millimetre.

(ii) Calculate the capacity of the cylinder in litres, correct to two significant figures (1 Litre = 1000 cm^3). 2

QUESTION 23 – (continued)

MARKS

c) This box and whisker plot shows the ages of members at a lawn bowls club.



(i) What is the age of the oldest member? 1

(ii) Calculate the interquartile range of ages? 1

(iii) What statistical measure has the value of 60? 1

(iv) If there are 124 members in the club, how many of them are ages between 50 and 60? 1

QUESTION 24 - Start a new page

MARKS

a) Jonathan earns \$47 366 per annum as a company manager and \$4 865 as a part-time tax agent. He has allowable tax deductions of \$3 698 and throughout the year pays a total of \$12 699 in PAYE tax instalments. Find:

(i) His total income. 1

(ii) His taxable income 1

(iii) Tax payable on his taxable income by using the tax table below. 1

Taxable Income	Taxable Payable
\$1 - \$6 000	No tax payable
\$6 001 - \$20 000	17 cents per \$ in excess of \$6 000
\$20 0001 - \$50 000	\$2 380 plus 30 cents per \$ in excess of \$20 000
\$50 0001 - \$75 000	\$11 380 plus 42 cents per \$ in excess of \$50 000
\$75 001 - and over	\$21 880 plus 47 cents per \$ in excess of \$75 000

(iv) The Medicare levy on his taxable (the Medicare levy is 1.5% of taxable income). 1

(v) The tax refund or balance payable. 1

b) Tristan surveyed the students in Year 11 at his school and recorded the number of children in each family. The results are shown in the frequency distribution table below:

Number of children per family	Number of families (f)	Cumulative Frequency
1	7	7
2	26	33
3	A	45
4	9	B
5	5	59
9	1	60

(i) Write down the values of A and B. 2

(ii) How many students were surveyed? 1

(iii) Calculate the mean number of children per family. 2

(iv) The school is planning a Year 11 family BBQ. Based on his survey, Tristan is asked for the maximum number of children likely to attend. What is his reply? 1

c) Simplify $\frac{(2x)^3}{x^2} \div x$ 1

QUESTION 25 - Start a new page

MARKS

a) Jordan's gross pay is $1500 per fortnight.

(i) fortnightly deductions from Jordan's gross pay are:

- $269.17 for tax
- $7.88 for union fees
- $16.25 for private health insurance.

Calculate his fortnightly net pay. 2

(ii) Jordan is paid an annual leave loading of 17½% of 4 weeks' gross pay.
Calculate his annual leave loading. 2

(iii) Jordan visits Italy on his holidays. He pays € (180 euros) for a pair of boots. This price includes a tax of 20%.

What was the price of the boots before the tax was added? 2

(iv) How much is € 180 in Australian dollars if $A1 is worth € 0.58? 2

b) Sketch $P = 2t - 3$. Show both intercepts. 2

c) Sketch $2x-3y+6=0$. Show both intercepts. 2

END OF PAPER

Student Name: _____

Teacher: _____

Section I

Total marks (20)

Attempt questions 1-20

Allow about 30 minutes for this part

SOLUTIONS

Select the alternative A, B, C or D that best answers the question and indicate your choice with a cross (X) in the appropriate space on the grid below.

	A	B	C	D
1			✓	
2		✓		
3	✓			
4		✓		
5		✓		✓
6				✓
7			✓	
8			✓	
9	✓			
10		✓		

	A	B	C	D
11				✓
12	✓			
13	✓			
14			✓	
15		✓		
16			✓	
17	✓			
18		✓		
19	✓			
20			✓	

(5) C B A B D

(10) D C C A B

(18) D A A C B

(20) C A B A C

(21) a) $3 \times 10^5 \times 1000$ (1)

$= 3 \times 10^8$ (o.equiv.) (1)

b) $3 \times \sin 55^0 = 0$ (1)

$= 2.46\,m$ (1)

⇒ c) V of cuboid $78 \times 15 \times 25 = 28125$ (1)

− V of groove $\frac{10 \times 10 \times 15}{2} = 750$

⇒ $= 27375$ (1)

d) $F = 2C + 30$ (1)

e) (i) $2400 \times 2.40 = 5760$. Basic + stamp + 5760 (1) $= 5883.90$ (1)

$0.02 \times 5760 + 0.15 \times \frac{5800}{100}$

$115.2 + 87$

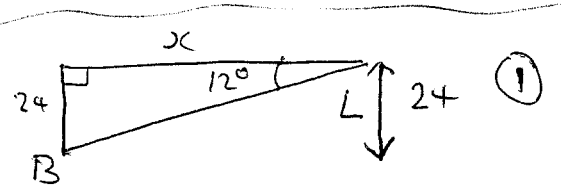
(ii) $0.061 \times 5760 = \$351.36$ or 14.64 c/share (1).

f) $\frac{15(3x-2)}{5} = \frac{15(4-x)}{3}$ (1) $\quad 3(3x-2) = 5(4-x)$

$9x - 6 = 20 - 5x$

$14x = 26$ (1) $\quad x = \frac{26}{14} = 1\frac{6}{7}$ o.e

(22) a)

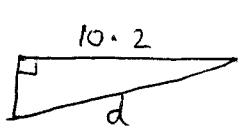


(1)

$x = \frac{24}{\tan 12^\circ} = 112.9\,m$ (1)

113

b) (i)



$d = (1.1^2 + 10.2^2)$ (1)

$= 10.3$ 1dp

(ii) $\frac{1 + 2.1}{2} \times 10.2$ (1)

$= 15.81\,m^2$ (1)

(iii) Area of floor $= 10.3$ (bld answer) $\times 3.2 = 32.96$

shaded walls $= 2 \times 15.81 = 31.62$ (1)

front + back $= (1 \times 3.2) + (3.2 \times 2.1) = 9.92$

$74.5\,m^2$ (1)

d) (i) $\frac{32}{0.96} = 1:33.\dot{3}$ (1)

(ii) $1200 \div 33.\dot{3} = 36\,cm$ (1)

$\$54 \times 74.5 = \$4023$. (1)

d) (i) $(35 \times 9.50) + (3 \times 9.50 \times 1.5) = 375.25$ (1)

(ii) $(412.45 - (11.30 \times 35)) / (11.30 \times 1.5) = 1$ (1)

(iii) $W = RN + 1.5RV$ (1)

not necessary to factorise.

① Allianz cheque ② Cash → NBC Sat ③ Mum

23 a) iii) $AB = 6 \tan 63^\circ$ ① or ①
$= 11.78$ m ←
$= 10$ cm ① 118 cm

iii) $AD = \sqrt{(AB^2 + BD^2)}$ ① or ①
$= 16.1$
$= 20$ cm

$\tan C = \frac{11.78}{11}$ ① $= 47^\circ$ ①

b) (i) $C = 2\pi r = 20\pi = 62.8$ cm ① $= 628$ mm ①

(ii) $V = 628 \times 15$ ① $= 9420$ cm^3 $= 0.94\ell$ ① 4712.39 4.71ℓ

c) (i) 70 ① (ii) 15 ① (iii) Median ① (iv) 25% of 124 = 31 ①

24 a) (i) $47366 + 4865 =$ \$52231 ①

(ii) $52231 - 3698 =$ \$48533 ①

(iii) $2380 + \$0.3 \times (48533 - 20000)$ ①
€10939.90

(iv) $\times 0.015$ (v) 0.015×48533 €\$728.00 ①

(v) $12699 - (10939.90 + 728)$
€1031.10 refund. ①

b) (i) $A = 12$
$B = 54$ ②

(ii) 60 ①

(iii) $(7\times1 + 26\times2 + 12\times3 + 9\times4 + 5\times5 + 1\times9) \div 60$ ①
$= \frac{165}{60}$
$= 2.75$ ①

(iv) 165 ①

c) $\frac{8x^3}{x^2} \div x$
$= \frac{8x}{x}$ ①
$= 8$ ①

25
(i) $1500 - (269.17 + 7.88 + 16.25)$ ①
€1206.70 ①

(ii) $1500 \times 2 \times 0.175$ ①
€1050 ① 525

(iii) $\frac{180}{1.2}$ ①
€150 ①

(iv) $\frac{180}{0.58}$ ①
\$310.34 ①

b) Linear passing through $(0, -3)$ ① and $(1.5, 0)$ ①

c) Linear passing through $(0, 4)$ ① and $(-3, 0)$ ①

① sketch
①