

Name: _____

HURLSTONE AGRICULTURAL
HIGH SCHOOL

H.S.C. ASSESSMENT TASK 1
NOVEMBER, 2007.

General Mathematics

Examiners – R Yen, G. Huxley.

General Instructions

- Reading time – 2 minutes
- Working time – 40 minutes
- Calculators may be used

Total marks – 34

Section 1: 10 marks

- 10 multiple-choice questions
- Mark answers on the Section 1 answer sheet provided
- Allow about 10 minutes for this section

Section 2: 24 marks

- 2 questions worth 12 marks each
- Write answers to each question on a separate sheet of paper.
- Allow about 30 minutes for this section

Section I

- 10 multiple-choice questions: 10 marks
- Allow about 10-15 minutes for this section
- For each question, mark the correct answer A, B, C or D on the Section I answer sheet provided

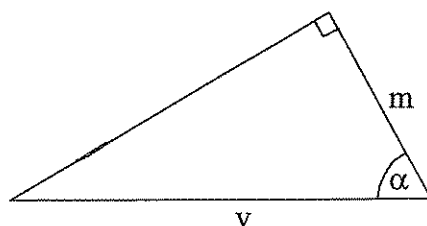
- 1 This table shows the frequencies for a set of data.

Score x	Frequency f	fx
1	5	5
2	11	22
3	3	9
4	7	28
5	2	10

What is the mean of this data correct to one decimal place?

- (A) 5.6 (B) 14.8
(C) 4.9 (D) 2.6
- 2 What is the mode of the data in Question 1?
- (A) 2 (B) 3
(C) 5 (D) 11
- 3 Which measure of location can have more than one value?
- (A) mean (B) median
(C) mode (D) range

4

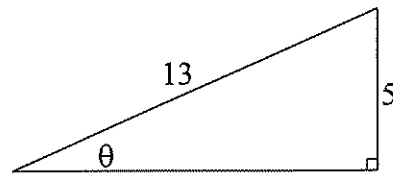


NOT TO SCALE

Which statement is correct?

- (A) $m = v \sin \alpha$ (B) $v = m \sin \alpha$
(C) $m = v \cos \alpha$ (D) $v = m \cos \alpha$

5.

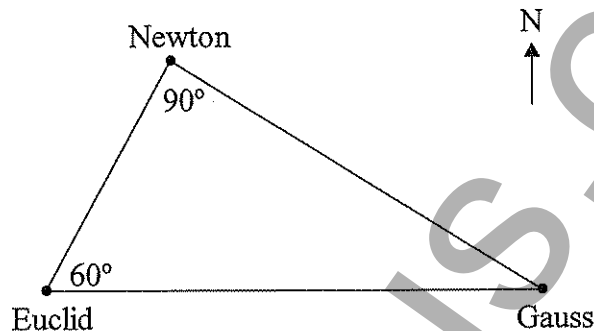


The size of θ is closest to

- (A) 27° (B) 69°
(C) 67° (D) 21°

6.

Three towns, Euclid, Gauss and Newton, are situated as shown in the diagram. Gauss is due east of Euclid.



The bearing of Gauss from Newton is

- (A) 030° (B) 120°
(C) 150° (D) 300°

7.

Which word or phrase correctly describes the probability of rolling the number 8 on a normal 6-sided die?

- (A) unlikely (B) impossible
(C) even chance (D) probable

8.

A coin is tossed and a die is rolled. How many possible outcomes contain Tails and an odd number?

- (A) 3 (B) 4
(C) 6 (D) 12

9.

One letter is chosen at random from the words WAGGA WAGGA. Which letter is the least likely to be selected?

- (A) W (B) A
(C) G (D) A or G

10. Current yellow N.S.W. car number plates contain 2 letters, followed by 2 digits, followed by 2 letters. For example:

AB-32-CD

Which of the following calculations is equal to ~~calculations could be used to determine~~ the total possible number of number plates?

- (A) 1 000 000 (B) 45 697 600
(C) 456 976 (D) 6 760 000

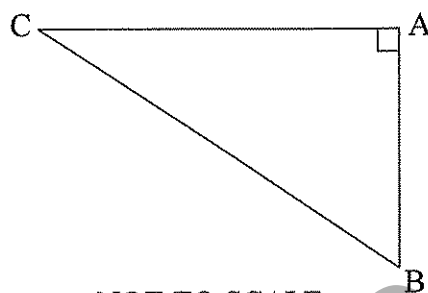
Section II

- 2 questions, 12 marks each: 24 marks
- Allow about 25-30 minutes for this section
- Answer each question on a SEPARATE sheet of paper
- All necessary working should be shown in every question

QUESTION 11 (12 marks) Use a separate sheet of paper

Marks

(a).

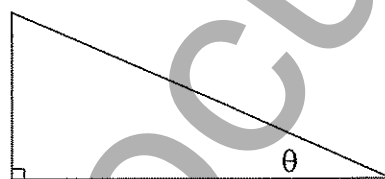


NOT TO SCALE

B is 844 metres due south of A. C is due west of A. The bearing of C from B is 295° . Find the distance BC, to the nearest metre.

2

(b).



NOT TO SCALE

If $\sin \theta = \frac{3}{5}$ find the value of $\tan \theta$.

2

(c)

A boat sails in a straight line from a point O on a bearing of 138° . After a while it is at a point G, which is 23 km from O.

(i). Draw a diagram showing all the above information.

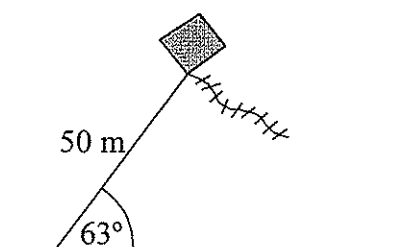
1

(ii). Calculate, to the nearest 0.1 km, how far east the boat is of its starting point

1

(d)

A kite is attached to the ground by a 50 metre string. The string makes an angle of 63° with the ground. How high is the kite above the ground? (Give your answer correct to 1 decimal place)

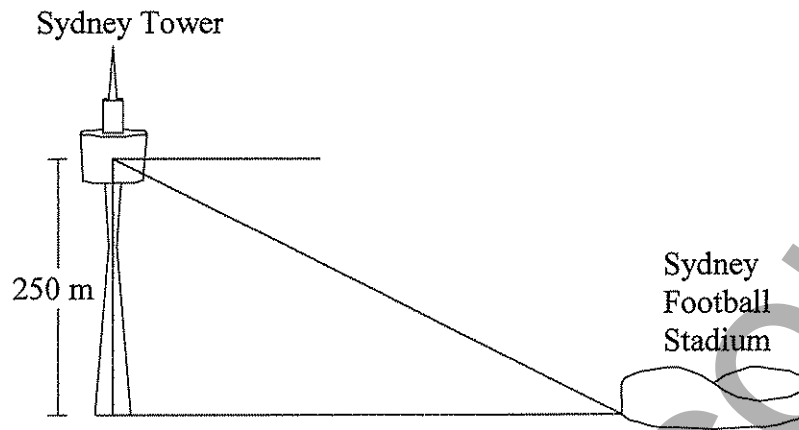


NOT TO SCALE

1

Question 11 continues next page.

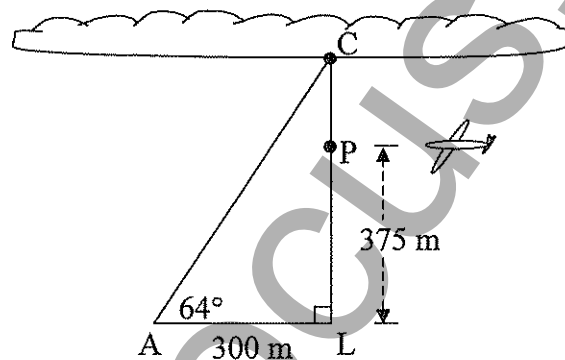
- (e) The observation deck of Sydney Tower is about 250 m above the ground level of the Sydney Football Stadium. The angle of depression of the Sydney Football Stadium from the deck of Sydney Tower is 6° .



NOT TO SCALE

Calculate, to the nearest 100 m, the horizontal distance from the Tower to the Stadium. 2

- (f).



NOT TO SCALE

L is a searchlight on the ground. A vertical beam from L hits a cloud at C. An observer at A, 300 m from L, observes the angle of elevation of C to be 64° .

- (i) Find the height of the cloud above the ground. Give your answer to the nearest metre. 1
- (ii). A plane is flying on a level course at a height of 375 m. The plane flies through the searchlight beam at P. Calculate the angle of elevation of P from A. Give your answer to the nearest degree. 2

QUESTION 12 (12 marks) Use a SEPARATE sheet of paper.

Marks

- (a) A sample of students was surveyed yesterday on how many boxes of chocolates they had sold for charity:

3 5 5 6 8 8 9 10 10 50

- (i) Calculate the mean of this set of scores. 1
- (ii) Calculate correct to one decimal place the sample standard deviation. 1
- (iii) How will the mean and the standard deviation be affected if the outlier is removed from this set of scores? Give reasons for your answers. 2

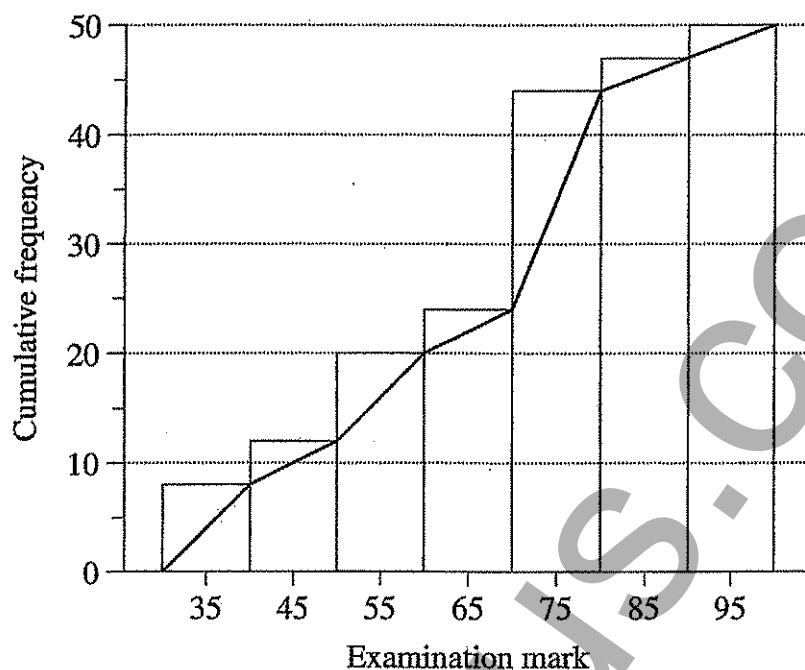
- (b) The ages of the swimmers at a health club are shown on the stem-and-leaf plot.

1	1 2 3
2	0 2 2 2 4 5
3	0 0 1 7
4	6 7
5	2
6	4 4

- (i) Find the mode of this set of data. 1
- (ii) Find the median. 1
- (iii) Find the interquartile range. 1
- (iv) Construct a box-and-whisker plot for this data. 2

Question 12 continues next page.

- (c) The English examination results of 50 students were grouped into class intervals and displayed on a cumulative frequency histogram and polygon.



(i) How many students scored a mark of 50 or below?

1

(ii) Write an estimate for the median mark?

1

(iii) Write an estimate for the upper quartile, Q_3 .

1

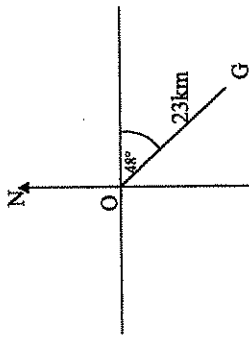
Section I Answer Sheet

Name: _____

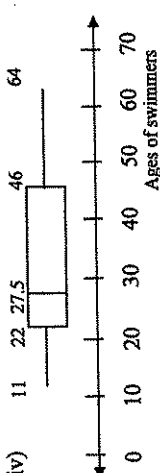
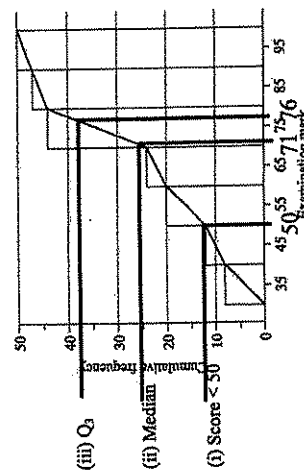
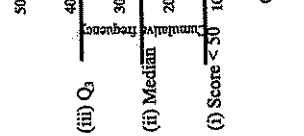
- For each question, select the alternative A, B, C or D that best answers the question.
- Fill in the response oval completely.

- | | | | | |
|----|-------------------------|-------------------------|-------------------------|-------------------------|
| 1 | A ☐ | B ☐ | C ☐ | D ☐ |
| 2 | A ☐ | B ☐ | C ☐ | D ☐ |
| 3 | A ☐ | B ☐ | C ☐ | D ☐ |
| 4 | A ☐ | B ☐ | C ☐ | D ☐ |
| 5 | A ☐ | B ☐ | C ☐ | D ☐ |
| 6 | A ☐ | B ☐ | C ☐ | D ☐ |
| 7 | A ☐ | B ☐ | C ☐ | D ☐ |
| 8 | A ☐ | B ☐ | C ☐ | D ☐ |
| 9 | A ☐ | B ☐ | C ☐ | D ☐ |
| 10 | A ☐ | B ☐ | C ☐ | D ☐ |

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General Mathematics HSC Assessment Test Nov. 2007		
Questions 1 to 11 solutions and marking guidelines		
Outcomes addressed in these questions P6 performs calculations in relation to two-dimensional and three-dimensional figures P9 determines an appropriate form of organisation and representation of collected data P10 performs simple calculations in relation to the likelihood of familiar events.		
Solution	Outcome, marking guidelines, examiner's comment	
SECTION 1 1. D 2. A 3. C 4. C 5. D 6. B 7. B 8. A 9. A 10. B	P9: Questions 1, 2, 3: 1 mark each P6: Questions 4, 5, 6: 1 mark each P10: Questions 7, 8, 9, 10: 1 mark each	
SECTION 2: QUESTION 11 (a) $\cos 65^\circ = \frac{844}{BC}$ $\therefore BC = \frac{844}{\cos 65^\circ}$ $= 1997 \text{ m}$ (b) $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$ Adjacent side = 4 units (using Pythagoras) $\therefore \tan \theta = \frac{3}{4}$ (c) (i)	P6: 2 marks 2 marks: correct answer 1 mark: finding the angle size of 65° from the information. 1 mark: correct calculation from incorrect angle. P6: 2 marks 2 marks: correct answer. 1 mark: finding adjacent sidelength = 4. Note: the question does not ask for the value of θ	
	P6: 1 mark 1 mark: diagram indicating the 23 km length and correctly indicating an angle at O (either 48° or 138° or 42°).	
(ii) $\cos 48^\circ = \frac{x}{23}$ $x = 23 \cos 48^\circ$ $= 15.4 \text{ km}$	P6: 1 mark 1 mark: correct from previous diagram.	
(d) $\sin 63^\circ = \frac{h}{50}$ $h = 50 \sin 63^\circ$ $= 44.6 \text{ m}$	P6: 1 mark	

(e) $\tan 6^\circ = \frac{250}{d}$ $d = \frac{250}{\tan 6^\circ}$ $= 2378.59 \text{ m}$ $= 2400 \text{ m to nearest } 100\text{m.}$	P6: 2 marks 2 marks: correct calculation and correct rounding, from the calculation used. 1 mark: one correct from above. Note: There are other correct solutions using the 84° angle.
(f) (i) $\tan 64^\circ = \frac{h}{300}$ $h = 300 \tan 64^\circ$ $= 615 \text{ m}$ (ii) $\tan^{-1} \frac{375}{300} = 51.34$ Therefore, angle of elevation = 51° to nearest degree.	P6: 1 mark
	P6: 2 marks 2 marks: Correct calculation and correct rounding, from the calculation used. 1 mark: one correct from above.

Year 12 General Mathematics Assessment Task 1 2007		
Solutions and marking guidelines		
Outcomes addressed in this question	Outcome, marking guidelines, examiner's comment	
P9: determines an appropriate form of organization and representation of collected data	QUESTION 12 (a) Using the calculator's statistics mode: (i) Mean = 11.4 (ii) Sample SD, $\sigma_{n-1} = 13.7614 \dots \approx 13.8$ (iii) The mean will decrease because the highest score has been removed, resulting in a much smaller sum of scores. The standard deviation will decrease because the spread of scores will be smaller. (b) (i) Mode = 22 most common age (ii) Median = $\frac{25 + 30}{2}$ average of 9th/10th scores $= 27.5$ (iii) $Q_1 = 22$ median of first 9 scores $Q_3 = 46$ median of last 9 scores Interquartile range = $46 - 22 = 24$ (iv)  (c) (i) Approx. 12 reading from 50 on exam axis (ii) Median ≈ 71 reading from 25 on cf axis (iii) $Q_3 \approx 76$ reading from 37.5 on cf axis (iii)  (ii)  (i) Score < 50	
	P9: 1 mark P9: 1 mark P9: 2 marks 2 marks: correct answer and reason 1 mark: correct answer only Most students lost a mark here because they couldn't explain their reasons adequately, often repeating their answer by saying 'the mean will decrease because the outlier increases the mean' P9: 1 mark P9: 1 mark P9: 1 mark Students did not lose marks if they calculated $46.5 - 21 = 25.5$ by disregarding the 2 middle scores to find the quartiles, but this is a less conventional method. P9: 2 marks 2 marks: correct box-and-whisker plot 1 mark: one error or lack of an even scale Many students scored only 1 mark P9: 1 mark: accepted 11 to 13 P9: 1 mark: accepted 70 to 74 P9: 1 mark: accepted 75 to 79	