

**PART A: BASIC SKILLS**

1. Evaluate:

(a)  $3(4 - 2) + 14 \div (-7) + 3$

[2]

(b)  $15 + \left[ \frac{3}{4} \text{ of } (15 - 3) \right] - 6$

[3]

2. Expand and/or simplify:

(a)  $3m^2 - 2n + 5mn - 7n - 7m^2$

[2]

(b)  $(3x - 2y) + 2(4x + y) - (4x - y)$

[3]

(c)  $(x - 3)(2x + 1)$

[2]

(d)  $4(m - 2)(m + 7)$

[3]

(e)  $3(2y - 4)^2$

[3]

3. Solve the following for x :

(a)  $3(x - 1) - x = -5$

[3]

(b)  $\frac{x}{3} = \frac{x}{9} + 2$

[3]

(c)  $\frac{7}{x} = \frac{2}{-3}$

[2]

4. Express each ratio in simplest / lowest terms.

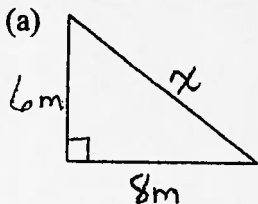
(a)  $9 : 12 : 27$

[1]

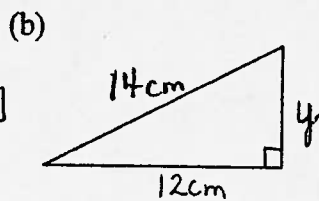
(b)  $90\text{min to } 1\frac{1}{4}\text{ hr}$

[2]

5. Solve for the indicated unknown(s).



[2]

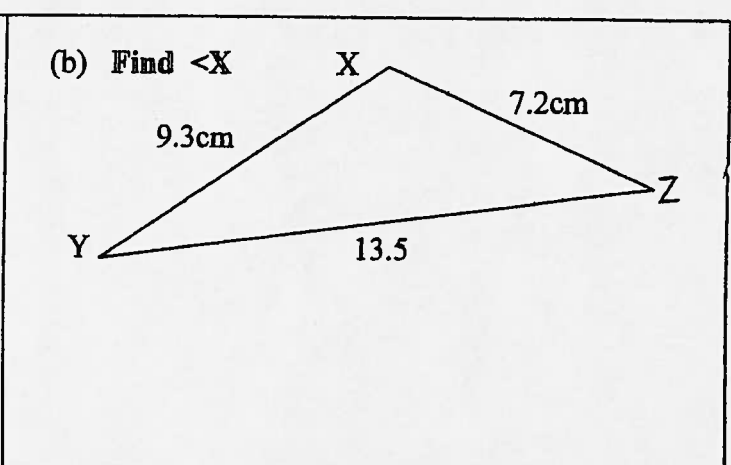
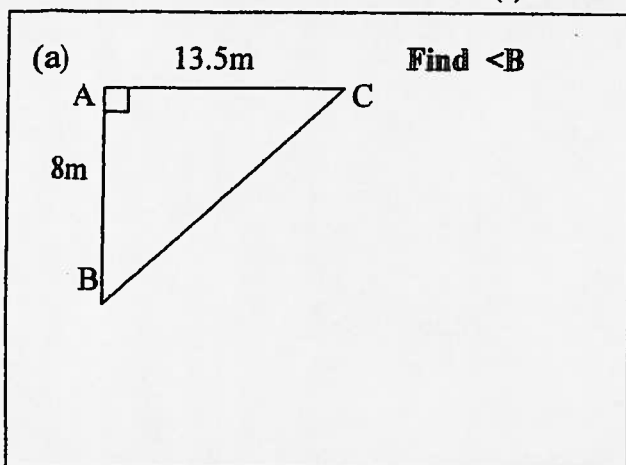


[2]

**PART B: TRIGONOMETRY** (State angles to the nearest degree and side lengths to the nearest tenth.)

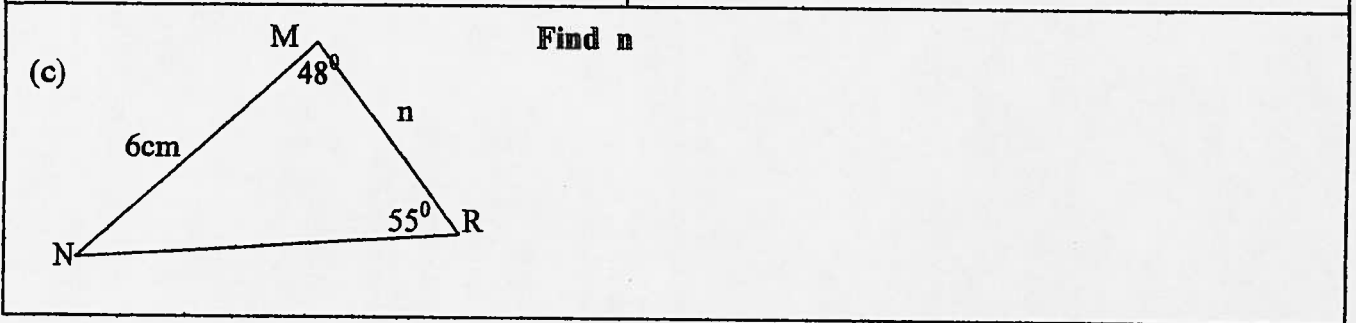
1. Solve for the indicated unknown(s):

[2]



[3]

[3]

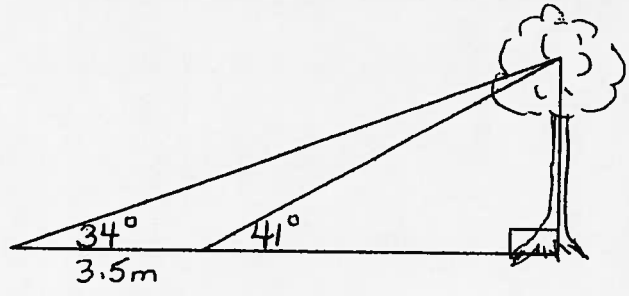


2. An 8m ladder, leaning against a building, makes an angle of  $38^\circ$  with the building. How far up the building does the ladder reach?

[4]

3. Laura, wishing to calculate the height of a tree in her back yard, stands at her back door and measures the angle of elevation to the top of the tree to be  $34^\circ$ . She then walks 3.5m directly toward the tree, and now finds the angle of elevation to be  $41^\circ$ . What is the height of the tree?

[6]



4. Captain Jack Sparrow is anchored at Isle de los Nombres 40 miles north of Tortuga when he spots billowing smoke in the distance, at a bearing of  $N60^\circ W$ . He sets sail in that direction and, 20 miles later, finds the charred remains of a fishing vessel. As he mutters "Scurvy Pirates!" to himself, he wonders how long it will take him to get back to Tortuga. Sketch the positions of Tortuga, Isle de los Nombres and the burnt fishing vessel in a correctly labeled diagram and calculate how far the fishing vessel is from Tortuga.

[5]

**PART C: QUADRATIC RELATIONS**

1. Factor:

(a)  $5x^2 - 25x$

(b)  $m^2 - 49$

(c)  $x^2 - 6x - 16$

(d)  $18y^2 - 50$

[9]

2. Solve the following quadratic equations.

(a)  $x^2 - 9x + 18 = 0$

(b)  $x^2 - 5x - 40 = 2 - 4x$

[2]

[4]

3. Given a parabola defined by the equation  $y = 2(x - 3)^2 - 8$ .

(a) State the vertex, axis of symmetry, how it opens and the step pattern.

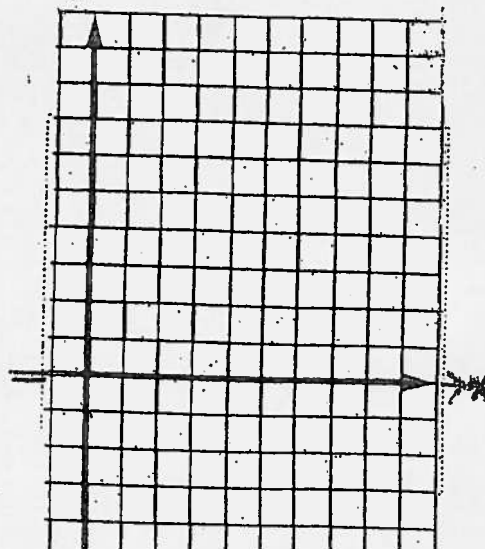
[4]

(b) Write the equation in standard form and state the y intercept and the coordinates of its symmetry point.

[5]

(c) Sketch the parabola to the right, marking the information from (a), (b) above.

[2]



4. The equation  $h = -5t^2 + 30t$  represents the height of a toy rocket. Height is measured in metres and time is in seconds.

(a) From what height was the rocket initially thrown?

(b) How long was it in the air?

[2]

[4]

(c) Find the maximum height of the rocket.

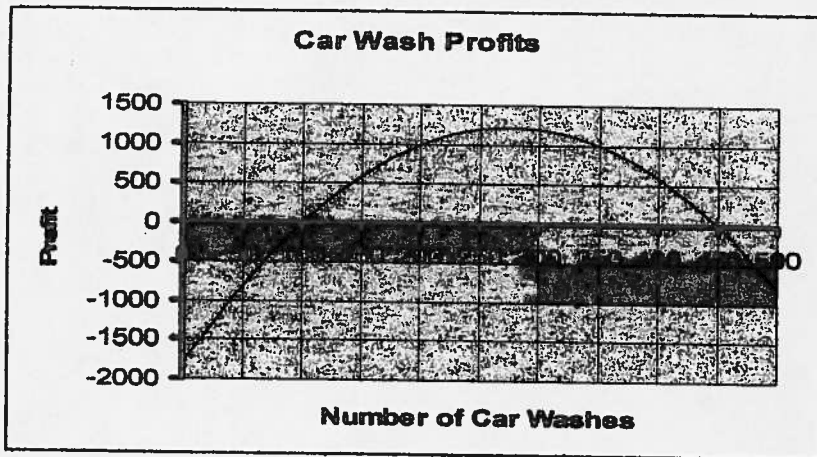
(d) At what time(s) was the rocket at a height of 25m?

[3]

[5]

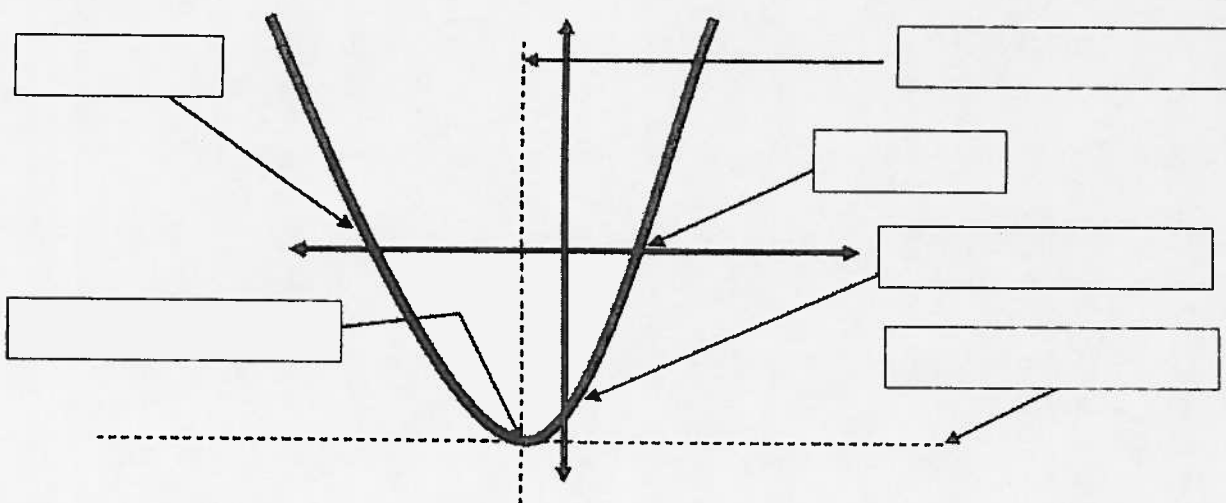
5. Questions (i) to (v) refer to the example below

The fundraising director of a high school has compiled data about the school's car washes. The data was sent to be analyzed by the Mathematics Team and they produced a written report for the director. The report was emailed to the director but unfortunately, only the graph below was received by the director.



- (i) What is the maximum profit possible?  
 (a) 275 cars (b) \$1500 (c) \$100 and \$450 (d) \$1225
- (ii) How many cars need to be washed in order to make this profit?  
 (a) 275 cars (b) 200 cars (c) 100 cars (d) 500
- (iii) If the director would like to make \$1000 profit, how many cars need to be washed?  
 (a) 200 cars (b) 350 cars (c) 200 or 350 cars (d) 275 cars
- (iv) A company is said to "break even" when revenue equals expenses, or when profit equals zero. How many car washes are needed for the fundraiser to break even?  
 (a) 275 cars (b) 100 cars (c) 100 or 450 cars (d) 0 cars
- (v) Which of the following equations would best describe the above graph?  
 (a)  $y = 0.5(x - 275)^2 + 1225$  (b)  $y = -275(x - 100)^2 + 450$   
 (c)  $y = -0.04(x - 275)^2 + 1225$  (d)  $y = 2(x - 275)^2 + 1225$

6. Label the features of the Parabola [6]



**Part A: Statistics [25 marks]**

For Questions 1 to 5, circle T(true) or F(false)

1. "Categorical data" refers to numbers which may take on any value. T F
2. A normal distribution is a symmetric, bell-shaped distribution. T F
3. Samples are usually used because they are more accurate than a census. T F
4. A histogram is similar to a bar graph except there are spaces between the bars. T F
5. Parkside was chosen from all the high schools in Thames Valley to have its students surveyed about smoking patterns with teens. This is an example of "cluster sampling". T F
6. The Runner's Room is doing a study on how often shoes need to be replaced. They are hoping to find a running shoe which they will advertise as their "Feature Shoe". The managers have narrowed down the choices to two shoes with data shown below.

| Tester  | Number of kilometers run before shoe needed to be replaced |                     |
|---------|--|---------------------|
|         | Nike "Harmony"   | New Balance "Libra" |
| Julia   | 500  | 600                 |
| John    | 550  | 550                 |
| Jessica | 450  | 575                 |
| Jarell  | 475  | 650                 |
| Jillian | 800  | 575                 |
| Jolicia | 525  | 625                 |

(a) Fill in the table below (use the space in the table for your calculations)

|                    | Nike "Harmony" | New Balance "Libra" |
|--------------------|----------------|---------------------|
| Mean               |                |                     |
| Median             |                |                     |
| Mode               |                |                     |
| Range              |                |                     |
| Standard Deviation |                |                     |

(b) Based on the data analysis above, what shoe would you recommend as the "Feature Shoe"? Justify your decision.

[5]

[16]

[4]

**Part B: Probability [14 marks]**

*For questions 1 – 5, circle the most appropriate answer [5 marks]*

1. A card is drawn from a regular 52 card deck of playing cards. The probability of not drawing an Ace is:  
(a)  $\frac{1}{13}$       (b)  $\frac{3}{4}$       (c)  $\frac{12}{13}$       (d)  $\frac{1}{4}$
2. How many times can you expect to roll a multiple of 3 on a single die if you roll it 48 times?  
(a) 2      (b) 48      (c) 16      (d) 24
3. A pair of dice is rolled. What is the probability that a sum of seven turns up?  
(a)  $\frac{7}{36}$       (b)  $\frac{1}{6}$       (c)  $\frac{1}{9}$       (d)  $\frac{1}{12}$
4. The letters of the word MISSISSIPPI are cut apart, placed in a box and shaken well. What is the probability of drawing an 'S' on the second draw if an 'S' was drawn on the first draw and not replaced?  
(a)  $\frac{3}{10}$       (b)  $\frac{3}{11}$       (c)  $\frac{2}{5}$       (d)  $\frac{4}{11}$
5. Which of the following answers could not be an answer to a probability question?  
(a) 0      (b) 17%      (c) 1.5      (d)  $\frac{13}{76}$

*For questions 6 - 9, answer in the space provided, showing all work and using good form.*

6. Determine the probability of each of the following situations: [7 marks]

- (a) a red Queen is drawn from a standard deck of 52 playing cards.
- (b) a multiple of 5 is chosen randomly from the numbers 1 to 100.
- (c) a vowel is chosen from the letters A B B C D E E E F.
- (d) a black ball is not chosen when drawing a ball from a bag containing 3 white, 5 blue and 7 black balls.
- (e) tossing heads three times in a row.

7. A pair of dice are rolled and the product of the upfaces is noted. [2 marks]

(a) Complete the outcome table to the right, showing the various outcomes (products) possible.

|   | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 |   |   |   |   |   |   |
| 2 |   |   |   |   |   |   |
| 3 |   |   |   |   |   |   |
| 4 |   |   |   |   |   |   |
| 5 |   |   |   |   |   |   |
| 6 |   |   |   |   |   |   |

(b) Find the probability of rolling a product that is greater than 10.