



568-314

Mathematics

GUIDE  
Written Examination

Secondary 3

January 2005

## 1. GENERAL INFORMATION

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|-----|---------------------|---|
| 1.1 | Program             | Mathematics, Secondary 3 (568-316),<br>Select Topics  |
| 1.2 | Origin              | Lester B. Pearson School Board, 2004  |
| 1.3 | Time allotted       | Oral Mental Math examination: 20 minutes<br>Written Examination: 2 hours  |
|     | Administration      | The examination is to be given in two sessions.<br><br>The Oral Mental Math Examination is worth 11% of the exam. It should be given during a regular class period.<br><br>The Written Examination is worth 89% of the exam.<br><br>Together they comprise a formative evaluation of the Mathematics 314 course worth 100%. |
| 1.4 | Number of questions | Mental Math: 14 questions<br><br>Written Examination: 25 questions distributed as follows:<br>14 multiple-choice questions<br>7 short-answer questions<br>4 developed-response questions  |
| 1.5 | Authorized material | Written Examination: Ruler, compass, set square, protractor and scientific calculator with or without a graphic display.  |

The calculator must be portable and designed primarily to perform mathematical calculations. Computers and calculators with a QWERTY keyboard, symbol manipulation capabilities or an electronic date book are not permitted. User guides, memory expansion features or any other calculator accessories are not permitted during the examination. Students may not share their calculators with other students. Communication links between calculators are also forbidden during the examination.

The memory aid is **one** letter-size sheet of paper (8.5 × 11") on which a student will have recorded information of his or her choice. Students are encouraged to work on and revise their memory aids throughout the year. Both sides of the sheet may be used. Any mechanical reproduction of this memory aid is forbidden. Students may not share their memory aids with any other students.

**2. INSTRUCTIONS FOR TEACHERS**

- Ensure that each student has all the material needed.
- Hand out the Question Booklets and read the instructions aloud to the students.
- Collect all booklets at the end of the examination.

**3. CORRECTION KEY**

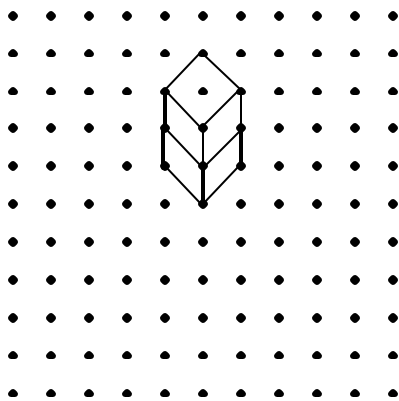
<b>Section 1: Questions 1 to 14</b>	<b>2 marks each</b>
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|--|---|
| 1. [A] <input checked="" type="checkbox"/> [C] [D] | 8. [A] [B] [C] <input checked="" type="checkbox"/>  |
| 2. [A] [B] <input checked="" type="checkbox"/> [D] | 9. [A] [B] <input checked="" type="checkbox"/> [D]  |
| 3. [A] <input checked="" type="checkbox"/> [C] [D] | 10. [A] [B] [C] <input checked="" type="checkbox"/> |
| 4. <input checked="" type="checkbox"/> [B] [C] [D] | 11. <input checked="" type="checkbox"/> [B] [C] [D] |
| 5. [A] <input checked="" type="checkbox"/> [C] [D] | 12. [A] [B] [C] <input checked="" type="checkbox"/> |
| 6. [A] <input checked="" type="checkbox"/> [C] [D] | 13. [A] [B] <input checked="" type="checkbox"/> [D] |
| 7. [A] [B] <input checked="" type="checkbox"/> [D] | 14. [A] [B] [C] <input checked="" type="checkbox"/> |

<b>Section 2: Questions 15 to 21</b>	<b>(14 marks)</b>
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15

/2



2 marks: both cubes drawn correctly  
 1 mark: one cube drawn correctly  
 0 marks: all other cases

Example of an appropriate solution

**16**

/2

$$\frac{3x^3 - 2x^2 + 5x^3 - 4x^2}{2x^2}$$

$$\frac{3x^3 + 5x^3 - 2x^2 - 4x^2}{2x^2}$$

$$\frac{8x^3 - 6x^2}{2x^2}$$

$$\frac{8x^3}{2x^2} - \frac{6x^2}{2x^2}$$

$$4x - 3$$

Simplified Expression: **4x - 3**

2 marks: correct answer with appropriate steps shown

1 mark: incorrect answer but correctly combined the like terms in the numerator or arrived at **1.5x + 2.5x - 1 - 2**

0 marks: all other cases

**17**

Example of an appropriate solution

/2

$$-a(3a + 2) - (a^2 + 4) + 3a$$

$$-3a^2 - 2a - a^2 - 4 + 3a$$

$$-4a^2 + a - 4$$

Simplified Expression:  **$-4a^2 + a - 4$**

2 marks: correct answer with appropriate steps shown

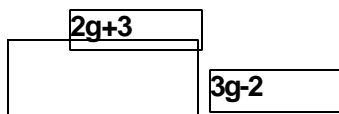
1 mark: incorrect answer but both brackets have been expanded correctly

0 marks: all other cases

**18**

Example of an appropriate solution

/2



$$(2g + 3)(3g - 2)$$

$$6g^2 - 4g + 9g - 6$$

$$6g^2 + 5g - 6$$

Area:  **$6g^2 + 5g - 6$**

2 marks: correct answer with appropriate steps shown

1 mark: incorrect answer but the binomials have been correctly multiplied

0 marks: all other cases

**19** Example of an appropriate solution

/2

$$16^{\frac{1}{2}} + 4^0 \cdot (-2)^2 - 2^{-1}$$

$$4 + 1 \cdot 4 - \frac{1}{2}$$

$$4 + 4 - \frac{1}{2}$$

$$8 - \frac{1}{2}$$

$$7\frac{1}{2}$$

Answer:  $7\frac{1}{2}$  or  $\frac{15}{2}$  or 7.5

2 marks: correct answer with appropriate steps shown

1 mark: incorrect answer due to one error

0 marks: all other cases

**20**

a	11	14	15	18
S	12	10.5	10	8.5

/2

2 marks: all four entries are correct

1 mark: only three entries are correct

or

1 mark: all four entries would have been correct had the student not rounded the values 10.5 and 8.5

0 marks: all other cases

**21** Example of an appropriate solution

/2

$$c^2 = 40^2 + 63^2$$

$$c^2 = 1600 + 3969$$

$$c^2 = 5569$$

$$c = \sqrt{5569}$$

$$c \approx 74.63$$

$$c \approx 74.6$$

Answer: The distance from the top of the lighthouse to the boat is **74.6** m.

2 marks: correct answer with appropriate steps shown

1 mark: incorrect answer due to one minor error in calculation or no answer but Pythagorean relation was

given (e.g.  $c^2 = 40^2 + 63^2$  or  $c = \sqrt{40^2 + 63^2}$ )

0 marks: all other cases

**Section 3: Questions 22 to 25**

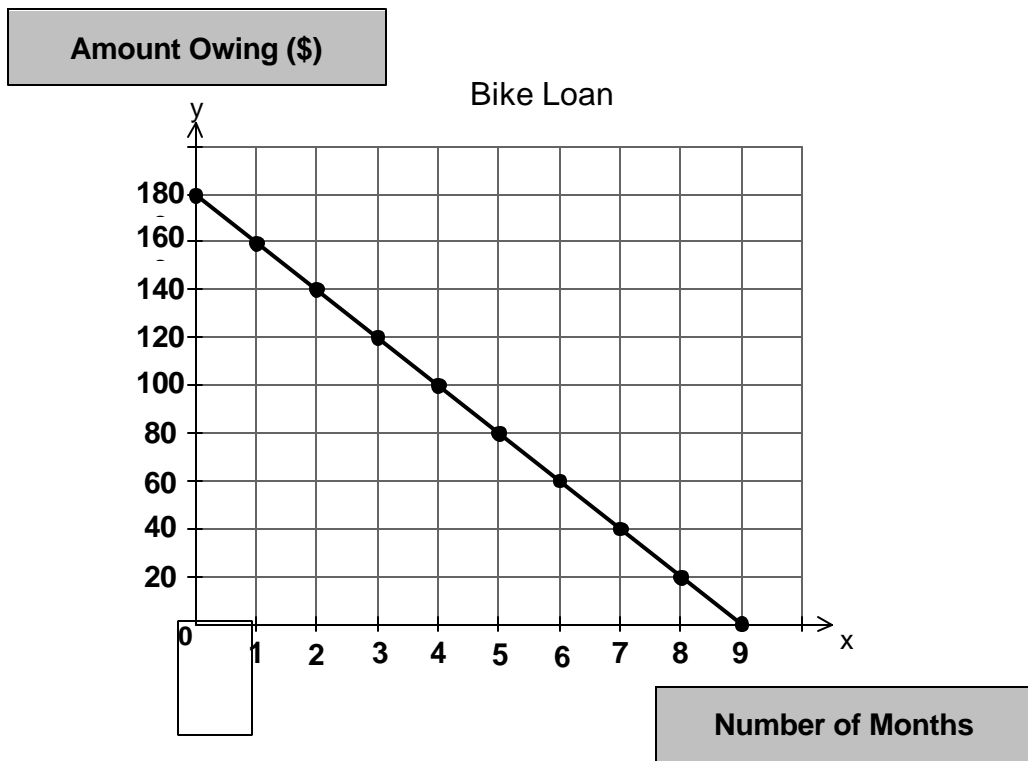
**(16 marks)**

**22**

/4

<b>Number of Months</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Amount Owning (\$)</b>	<b>180</b>	<b>160</b>	<b>140</b>	<b>120</b>	<b>100</b>	<b>80</b>	<b>60</b>	<b>40</b>	<b>20</b>	<b>0</b>

Assign 1 mark if all ordered pairs provided by the student in the table are correct  
 Assign 1 mark if the independent and the dependent variables have been correctly identified and written in the appropriate location in the table of values.



Assign 1 mark if both axes have been correctly labelled and an appropriate scale has been used on each axis  
 Assign 1 mark if the line-graph accurately reflects the information provided by the student in the table of values

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Examples of appropriate solutions  
Refer to the marking scale found in the appendix.

/4

Method 1

$$\text{Area of stage} = \text{Length} \times \text{Width} \quad \Rightarrow \quad \text{Width} = \frac{\text{Area}}{\text{Length}}$$

$$\text{Width} = \frac{2x^2 + 10x}{x} = 2x + 10$$

$$\begin{aligned} \text{Perimeter of Stage} &= 2(x) + 2(2x + 10) \\ &= 2x + 4x + 20 \\ &= 6x + 20 \end{aligned}$$

$$\begin{aligned} \text{Perimeter of Seating} &= 2(3x - 2) + 2(2x + 10) \\ &= 6x - 4 + 4x + 20 \\ &= 10x + 16 \end{aligned}$$

$$\begin{aligned} P_{\text{Seating}} - P_{\text{Stage}} &= (10x + 16) - (6x + 20) \\ &= 10x - 6x + 16 - 20 \\ &= 4x - 4 \end{aligned}$$

Answer: The difference is **(4x - 4)** units.

Note: Students have shown a partial understanding if they used an incorrect width to calculate the difference between the two perimeters.

Method 2

Since the stage and seating have the same width, the difference between their perimeters will be given by twice the difference between their lengths:

$$2[(3x - 2) - x] = 2(2x - 2) = 4x - 4$$

Answer: The difference is **(4x - 4)** units.

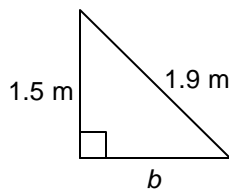
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Example of an appropriate solution

Refer to the marking scale found in the appendix.

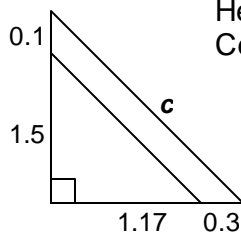
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To find the half-base of the tent:



$$\begin{aligned}
 b^2 &= c^2 - a^2 \\
 b^2 &= (1.9)^2 - (1.5)^2 \\
 b^2 &= 3.61 - 2.25 \\
 b^2 &= 1.36 \\
 \sqrt{b^2} &= \sqrt{1.36} \\
 b &\approx 1.166 \\
 b &\approx 1.17
 \end{aligned}$$

To find the length of the supporting rope:



Height of pole:

$$(1.5 + 0.1) \text{ m} = 1.6 \text{ m}$$

Centre of tent to end of supporting rope:

$$(1.17 + 0.3) \text{ m} = 1.47 \text{ m}$$

$$\begin{aligned}
 c^2 &= a^2 + b^2 \\
 c^2 &= 1.6^2 + 1.47^2 \\
 c^2 &\approx 2.56 + 2.16 \\
 c^2 &\approx 4.72 \\
 \sqrt{c^2} &\approx \sqrt{4.72} \\
 c &\approx 2.17
 \end{aligned}$$

Answer: Each supporting rope has a length of **2.17** m.

**Accept answers in the interval 2.10 to 2.20.**

Note: Students have shown a partial understanding if they have done one of the following:

- Correctly determined the half-base of the tent
- Used an incorrect half-base to solve for the length of the supporting rope



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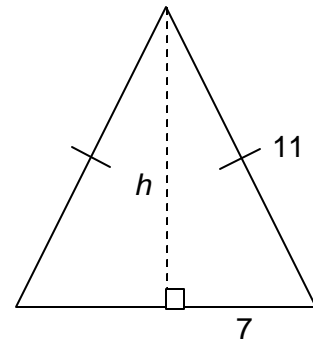
Find the Perimeter of the Triangle:

$$\begin{aligned}
 &(2x + 6) + 2(3x - 1) \\
 &2x + 6 + 6x - 2 \\
 &8x + 4
 \end{aligned}$$

$$\begin{aligned}
 P_{\Delta} &= 8x + 4 = 36 \text{ (given)} \\
 8x &= 32 \\
 x &= 4
 \end{aligned}$$

$$\begin{aligned}
 \text{Length of Base of Triangle} &= 2x + 6 = 2(4) + 6 = 8 + 6 = 14 \\
 \text{Length of Half-Base of Triangle} &= 14 \div 2 = 7
 \end{aligned}$$

$$\text{Hypotenuse of Right Triangle} = 3x - 1 = 3(4) - 1 = 12 - 1 = 11$$



Find the Height ( $h$ ) of the Triangle:

$$\begin{aligned}
 h^2 &= 11^2 - 7^2 \\
 h^2 &= 121 - 49 \\
 h^2 &= 72 \\
 \sqrt{h^2} &= \sqrt{72} \\
 h &\approx 8.49
 \end{aligned}$$

Find the Area of the Triangle:

$$A = \frac{1}{2} \times \frac{7}{1} = \frac{7}{2} \approx 59.4$$

**Answer:** The area of the isosceles triangle is **59.4** cm<sup>2</sup>.

*Note:* Students have shown a partial understanding if they correctly determined the value of  $x$ .

## Appendix

### MARKING SCALE

