

Grade 12
Essential Mathematics
Achievement Test

Marking Guide

June 2017

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Marking Guide. June 2017

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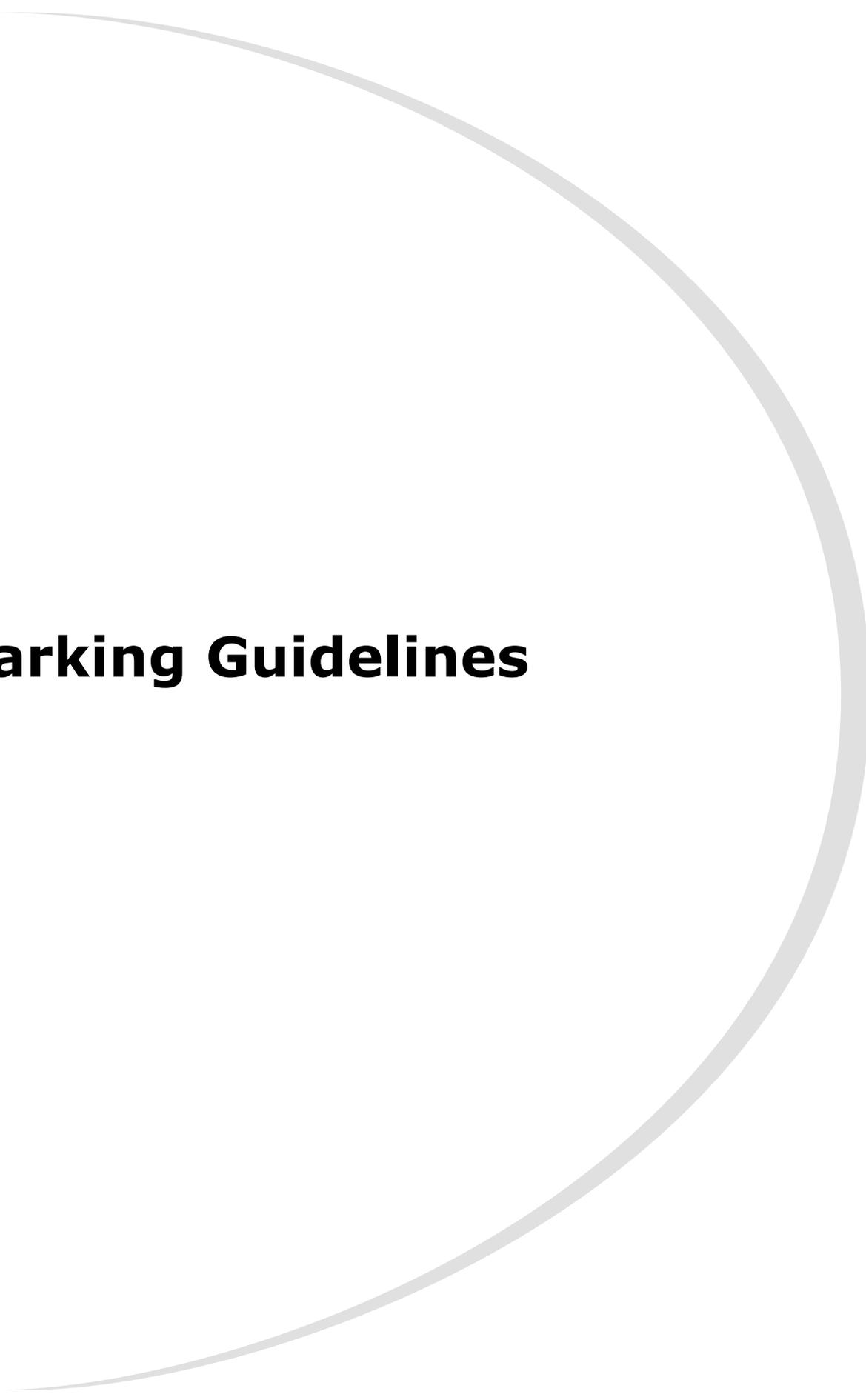
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While the department is committed to making its publications as accessible as possible, some parts of this document are not fully accessible at this time.

Available in alternate formats upon request.

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Marking Guidelines

Marking Guidelines

The *Grade 12 Essential Mathematics Achievement Test: Marking Guide (June 2017)* is based on *Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes (2014)*.

Please ensure that

- the student booklet number matches the number on the *Scoring Sheet*
- **only a pencil is used to complete the *Scoring Sheet***
- the final test mark is recorded on the *Scoring Sheet*
- the *Scoring Sheet* is complete and a copy has been made for school records

Please make no marks in the student test booklets. If the booklets have marks in them, the marks need to be removed by departmental staff prior to sample marking should the booklet be selected.

Once marking is completed, please forward the *Scoring Sheets* to Manitoba Education and Training using the envelope provided (for more information, see the administration manual).

Marking

The recommended procedure for scoring student responses is as follows:

1. Read the *Marking Guide*.
2. Study the student samples provided and the rationales for the allotted marks.
3. Determine the mark for the student's response by comparing its features with the *Marking Guide* descriptions. The descriptions and samples only typify a student's response to a given question; an exact match is not anticipated.

The marks allocated to questions are based on the concepts associated with the learning outcomes in the curriculum. For each question, shade in the circle on the *Scoring Sheet* that represents the mark awarded based on the concepts. A total of these marks will provide the preliminary mark.

Errors

Marks are deducted if conceptual or communication errors are committed.

Conceptual Errors

As a guiding principle, students should only be penalized once for each error committed in the context of a test question. For example, students may choose an inappropriate strategy for a question, but carry it through correctly and arrive at an incorrect answer. In such cases, students should be penalized for having selected an inappropriate strategy for the task at hand, but should be given credit for having arrived at an answer consistent with their choice of strategy.

Communication Errors

Errors not conceptually related to the learning outcomes associated with the question are called “Communication Errors” (see Appendix C). These errors result in a 0.5 mark deduction. Each type of error can only be deducted once per test and is tracked in a separate section on the *Scoring Sheet*.

When a given response includes multiple types of communication errors, deductions are indicated in the order in which the errors occur in the response. No communication errors are recorded for work that has not been awarded marks. The total deduction may not exceed the marks awarded.

The student’s final mark is determined by subtracting the communication errors from the preliminary mark.

Example:

A student has a preliminary mark of 56. The student committed two E1 errors (0.5 mark deduction) and three E4 errors (0.5 mark deduction).

COMMUNICATION ERRORS/ERREURS DE COMMUNICATION				
Shade in the circles below for a maximum total deduction of 2.5 marks (0.5 mark deduction per error type). Refer to <i>Marking Guide</i> for details.		Noircir les cercles ci-dessous pour une déduction maximale totale de 2,5 points (déduction de 0,5 point par type d’erreur). Consultez le <i>Guide de Correction</i> pour plus de détails.		
E1 <input checked="" type="radio"/>	E2 <input type="radio"/>	E3 <input type="radio"/>	E4 <input checked="" type="radio"/>	E5 <input type="radio"/>
Rounding/ Arrondissement	Units/ Unités	Transcription Transposition	Final Answer/ Réponse finale	Whole Units/ Unités entières

Test mark / Note au test :	<u>56</u>	-	<u>1</u>	=	<u>55</u>
	Preliminary Mark Note préliminaire		Communication Errors (maximum 2.5 marks) Erreurs de communication (maximum 2,5 points)		76

Marking Guidelines

Table Values

One mark will be awarded to a student that circles the correct value in a given table. In other words, this will be considered the equivalent of the student writing the correct value in the space provided.

Follow-through errors

Generally, a student will not be penalized more than once for the same error. A final answer will be deemed to be correct if it follows correctly from an incorrect intermediate step where marks were already lost. In multiple-part questions, if an error was made in Part A, but subsequent parts were completed appropriately based on the incorrect information in Part A, full marks will be awarded in subsequent parts.

Marks for follow-through errors will not be awarded if

- the answer is wrong and there are no part-mark increments available
- the error is conceptual in nature (e.g., the student used the simple Cosine ratio when the question called for the use of the Cosine Law)

Additional-information errors

Students can occasionally provide too much information in their answers. When additional information is provided, it must be clearly indicated as such. For example, if a student is asked to calculate a probability, then full marks are awarded for a correct answer even if the odds are also present—provided this additional information is labelled “odds.”

Irregularities in Provincial Tests

During the administration of provincial tests, supervising teachers may encounter irregularities. Markers may also encounter irregularities during local marking sessions. The appendix provides examples of such irregularities as well as procedures to follow to report irregularities.

If a *Scoring Sheet* is marked with “0” and/or “NR” only (e.g., student was present but did not attempt any questions) please document this on the *Irregular Test Booklet Report*.

Assistance

If any issue arises that cannot be resolved locally during marking, please call Manitoba Education and Training at the earliest opportunity to advise us of the situation and seek assistance if necessary.

You must contact the person responsible for this project before making any modifications to the marking keys.

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Home Finance

Question 1

E6.H.1

2 marks

Alain's total portioned assessment for his property is \$83 750. His municipality uses the following tax rates:

General Municipal: 21.01 mills

Provincial Education: 8.113 mills

Local School: 18.264 mills

Local Improvements: none

Calculate the total property tax that Alain will pay if he receives a provincial tax credit of \$700.

Answer:

$$\left. \begin{array}{l} \text{General Municipal: } \frac{\$83\,750 \times 21.01}{1000} = \$1759.59 \\ \text{Provincial Education: } \frac{\$83\,750 \times 8.113}{1000} = \$679.46 \\ \text{Local School: } \frac{\$83\,750 \times 18.264}{1000} = \$1529.61 \end{array} \right\} \leftarrow 1 \text{ mark for process}$$

$$\begin{aligned} \text{Total Property Taxes Due: } & \$1759.59 + \$679.46 + \$1529.61 - \$700 \\ & = \$3268.66 \qquad \qquad \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(2 marks)

$$GM = \frac{83750}{1000} \times 21.01 = \$1754.58$$

$$PE = \frac{83750}{1000} \times 18.264 = 1524.61$$

~~$$700 + 1754.58 + 1524.61 = 3979.19$$~~

$$1754.58 + 1524.61 - 700 = \$2579.19$$

Mark: 1 out of 2**Rationale:** Incorrect process (did not calculate provincial education tax)

E1 (rounds incorrectly) (General Municipal)

Note: No E1 deduction because no mark is awarded for this step.

Correct property tax (follow-through error) (1 mark)

Exemplar 2

(2 marks)

$$\frac{83750}{1000} \times 47.4 = \$3969.75$$

Mark: 1 out of 2**Rationale:** Correct process (alternate method) (1 mark)

E1 (rounds too soon) (mill rate)

Incorrect property tax (did not subtract the provincial tax credit)

Exemplar 3

(2 marks)

$$\frac{83750}{1000} = 83.75$$

$$1754.60 + 679.46 - 1524.61 - 700$$

$$\text{Total tax} = \$3268.67$$

Mark: 2 out of 2**Rationale:** Correct process (1 mark)

E1 (rounds incorrectly) (General Municipal)

Correct property tax (1 mark)

Question 2

E6.H.1

1 mark

Manitoba recently recorded one of the coldest winters on record.

State one energy-efficient improvement a homeowner could make to their home to reduce their heating bill.

Sample Answers:

- installing new windows
- installing weather stripping around doors
- installing a high-efficiency furnace
- re-insulating attic or walls

Exemplar 1

(1 mark)

install and use a wood burning fireplace.

Mark: 0 out of 1**Rationale:** Incorrect response**Exemplar 2**

(1 mark)

Bundle up
at night
and
turn the
heat down
2 degrees
or more

Mark: 0 out of 1**Rationale:** Incorrect response

Question 3

E6.H.1

2 marks

Bahari has \$40 000 worth of contents he would like to insure. He purchases a comprehensive tenant's insurance policy with a \$200 deductible.

Calculate his annual premium.

Annual Premium Table Tenant Package Policy (\$500 deductible)		
All Areas		
Coverage Amount	Standard Form	Comprehensive Form
\$25,000	\$158.00	\$200.00
\$30,000	\$174.00	\$226.00
\$35,000	\$199.00	\$252.00
\$40,000	\$212.00	\$269.00
\$45,000	\$235.00	\$298.00
\$50,000	\$254.00	\$324.00
\$55,000	\$272.00	\$346.00
\$60,000	\$293.00	\$373.00
\$65,000	\$315.00	\$400.00
\$70,000	\$337.00	\$427.00
\$75,000	\$359.00	\$454.00
Each additional \$1,000	\$4.50	\$5.50
\$200 deductible: increase premium by 10%		

Answer:

Annual premium (\$500 deductible): \$269 ← 1 mark

Annual premium (\$200 deductible): $\$269 \times 1.10$
 $= \$295.90$ ← 1 mark

Note to marker: Award 1 mark if the correct table value is indicated.

Exemplar 1

(2 marks)

$$269000 \times 1,10 = \$295900$$

Mark: 1 out of 2**Rationale:** Incorrect table value

Correct final answer (follow-through error) (1 mark)

Exemplar 2

(2 marks)

$$269.00 \times 10 = 26.90$$

Mark: 1 out of 2**Rationale:** Correct table value (1 mark)

Incorrect final answer

E2 (does not include units in final answer)

Note: No E2 deduction because no mark is awarded for this step.

Exemplar 3

(2 marks)

$$269.00 + .10 = 269.1$$

annual premium

Mark: 1 out of 2**Rationale:** Correct table value (1 mark)

Incorrect final answer

E4 (does not express the answer to the appropriate number of decimal places)

Note: No E4 deduction because no mark is awarded for this step.

Question 4

E6.H.1

2 marks

State 2 initial (one-time) costs when purchasing a house.

Place one response per line.

1. _____

2. _____

Sample answers:

- home inspection fees
- land transfer tax
- lawyer fees
- down payment
- movers
- utility hook-up fees
- insurance adjustment
- decorating/renovating costs
- appliances

(2 x 1 mark)

Note to marker: Award a maximum of 1 mark for each line.

Exemplar 1

(2 marks)

1. insurance
2. cost of water

Mark: 0 out of 2**Rationale:** Two incorrect responses (ongoing costs)**Exemplar 2**

(2 marks)

1. renovations
2. realtor

Mark: 1 out of 2**Rationale:** One correct response (renovations) (1 mark)**Exemplar 3**

(2 marks)

1. Moving truck
2. The purchase of the house 😊

Mark: 1 out of 2**Rationale:** One correct response (moving truck) (1 mark)

Question 5

E6.H.1

1 mark

Choose the letter that best completes the statement below.

When calculating property taxes, the cost of local improvements is based on:

- A) the area of the city
- B) the frontage
- C) the square footage of the house
- D) the distance from the fire hydrant

Answer: B)



Question 6

E6.H.1

3 marks

Paco earns \$3100 monthly and would like to purchase a new house. The monthly mortgage payment will be \$797, the monthly heating costs will be \$150 and the annual property taxes are \$2400.

Calculate Paco's Gross Debt Service Ratio (GDSR).

Answer:

Monthly property taxes: $\$2400 \div 12 = \200

$$GDSR = \frac{\left(\begin{array}{ccc} \text{Monthly} & \text{Monthly} & \text{Monthly} \\ \text{mortgage} & \text{property} & \text{heating} \\ \text{payment} & \text{taxes} & \text{costs} \end{array} \right)}{\text{Gross monthly income}} \times 100$$

$$= \frac{(\$797 + \$200 + \$150)}{\$3100} \times 100$$

[No mark for 1 correct substitution
or
1 mark for 2 or 3 correct substitutions
or
2 marks for all correct substitutions]

$$= 37\%$$

← 1 mark

Exemplar 1

(3 marks)

$$\text{GDSR} = \frac{797 + 2400 + 150}{3100} \times 100$$

$$\text{GDSR} = 107\%$$

Mark: 2 out of 3**Rationale:** 3 correct substitutions (1 mark)

Correct GDSR (follow-through error) (1 mark)

E1 (rounds incorrectly)

E4 (does not express the answer to the appropriate number of decimal places)

Exemplar 2

(3 marks)

$$\text{GDSR} = \left(\frac{\$797 + \$2400 + \$150}{3100} \right) \times 100$$

$$\text{GDSR} = \$107.98$$

Mark: 2 out of 3**Rationale:** 3 correct substitutions (1 mark)

Correct GDSR (follow-through error) (1 mark)

E1 (rounds incorrectly)

E2 (uses incorrect units of measure)

Exemplar 3

(3 marks)

$$2400/12 = 200$$

$$\text{GDSR} = \frac{797 + 150 + 200}{3100} \times 100$$

$$\text{GDSR} = 37$$

Mark: 3 out of 3**Rationale:** All correct substitutions (2 marks)

Correct GDSR (1 mark)

E2 (does not include units in final answer)

Andy is buying a house and needs a mortgage.

State 2 ways he can lower the total interest paid on the mortgage of the house.

Place one response per line.

1. _____

2. _____

Sample answers:

- make a larger down payment
- shorten his amortization period
- get a lower interest rate
- increase payment frequency
- make a lump sum payment

(2 x 1 mark)

Note to marker: Award a maximum of 1 mark for each line.

Exemplar 1

(2 marks)

1. make a larger down payment
2. purchase a less expensive house

Mark: 1 out of 2**Rationale:** One correct response (larger down payment) (1 mark)**Exemplar 2**

(2 marks)

1. higher down payment
2. increase amortization period

Mark: 1 out of 2**Rationale:** One correct response (higher down payment) (1 mark)**Exemplar 3**

(2 marks)

1. find a better interest rate
2. ask for a raise or get a better paid job

Mark: 1 out of 2**Rationale:** One correct response (find a better interest rate) (1 mark)

Probability

Question 8

E6.P.1

2 marks

The probability of Jen winning a swimming race is 1 out of 7.

State the probability of winning as a decimal and a percent.

Decimal: _____

Percent: _____

Answer:

Decimal: 0.14 ← 1 mark

Percent: 14.29% ← 1 mark

Exemplar 1

(2 marks)

Decimal: 14.28Percent: 14%**Mark: 1 out of 2****Rationale:** Incorrect decimal

E1 (rounds incorrectly)

Note: No E1 deduction because no mark is awarded for this step.

Correct percent (1 mark)

E4 (does not express the answer to the appropriate number of decimal places)

Exemplar 2

(2 marks)

Decimal: 0.143Percent: 14.3%**Mark: 2 out of 2****Rationale:** Correct decimal (1 mark)

E4 (does not express the answer to the appropriate number of decimal places)

Correct percent (1 mark)

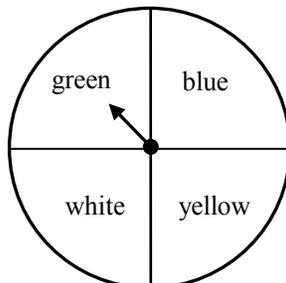
E4 (does not express the answer to the appropriate number of decimal places)

Question 9

E6.P.1

2 marks

The following spinner is divided into 4 colours.



The spinner was spun 40 times and the results are shown in the table below.

Colour	Number of Times
green	16
yellow	11
white	8
blue	5

A) State the experimental probability of spinning white. (1 mark)

Answer:

$\frac{1}{5}$ or 0.2 or 20% or one out of five

Note to marker: Accept equivalent representations.

B) State the theoretical probability of spinning white. (1 mark)

Answer:

$\frac{1}{4}$ or 0.25 or 25% or one out of four

Note to marker: Accept equivalent representations.

Exemplar 1

(2 marks)

A) $\frac{16}{40}$ chance for green

B) $\frac{1}{4}$ chance for any color

Mark: 1 out of 2**Rationale:** Incorrect answer in Part A

Correct answer in Part B (1 mark)

Exemplar 2

(2 marks)

A) 8 times of the 40 times

B) 8 or more times.

Mark: 1 out of 2**Rationale:** Correct answer in Part A (1 mark)

Incorrect answer in Part B

Question 10

E6.P.1

3 marks

The probability of a baseball team winning a tournament is 15%. The entry fee is \$200. If they win the tournament, the team will receive a cash prize of \$1000.

Calculate the expected value (EV).

Answer:

$$\text{\$gain: } \$1000 - \$200 = \$800$$

$$\text{\$loss: } \$200$$

$$EV = P(\text{win}) \times \text{\$gain} - P(\text{lose}) \times \text{\$loss}$$

$$= (0.15)(\$800) - (0.85)(\$200) \left\{ \begin{array}{l} \text{No mark for 1 correct substitution} \\ \text{or} \\ \text{1 mark for 2 or 3 correct substitutions} \\ \text{or} \\ \text{2 marks for all correct substitutions} \end{array} \right.$$

$$= -\$50$$

← 1 mark

OR

Answer:

$$\text{Average gain: } (0.15)(\$1000)$$

$$= \$150 \quad \leftarrow 2 \text{ marks}$$

$$EV = \$150 - \$200$$

$$= -\$50 \quad \leftarrow 1 \text{ mark}$$

Exemplar 1

(3 marks)

$$\begin{array}{l} \text{EV} = 0.15 (1000) \quad 200 + 150 \\ \text{EV} = 150 \quad = 350 \end{array}$$

Mark: 2 out of 3**Rationale:** Correct average gain (2 marks)
Incorrect final answer**Exemplar 2**

(3 marks)

Prize \$ 1000
fee \$ 200
probability = 15%

$$\begin{array}{l} \text{EV} = (\text{win}) \times \text{gain} - P(\text{lose}) \times \text{loss} \\ (0.15 \times 1000) - (0.85) \times 200 \\ 150 - 170 = -20 \\ \text{EV} = -20 \end{array}$$

Mark: 2 out of 3**Rationale:** 3 correct substitutions (1 mark)
Correct final answer (follow-through error) (1 mark)
E2 (does not include units in final answer)**Exemplar 3**

(3 marks)

$$\begin{array}{l} 0.15 \times 900 = 135 \\ 0.75 \times -200 = \underline{-150} + \\ \quad \quad \quad -\$15 \end{array}$$

Mark: 2 out of 3**Rationale:** 2 correct substitutions (1 mark)
Correct final answer (follow-through error) (1 mark)

Question 11

E6.P.1

2 marks

Akuna is the manager of an assembly line that makes compact fluorescent light bulbs. Workers on the assembly line randomly chose 250 light bulbs to test and found 1 defective light bulb.

A) State the experimental probability, in fraction form, of a light bulb being defective. (1 mark)

Answer:

$$\frac{1}{250}$$

Note to marker: Accept equivalent representations.

B) State the number of defective light bulbs that are expected in a shipment of 5000 light bulbs. (1 mark)

Answer:

$$\begin{aligned} \text{Defective light bulbs} &= \frac{1}{250} \times 5000 \\ &= 20 \text{ bulbs} \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(2 marks)

A) $\frac{1}{250} = 4 \text{ being defective}$

B) $\frac{250}{5000} = 0.05 \times 100 = 5 \text{ * defective light bulbs}$

Mark: 0 out of 2**Rationale:** Incorrect answer in Part A

Incorrect answer in Part B

Exemplar 2

(2 marks)

A) $\frac{1}{249}$

B) $\frac{1}{249} \times 5000 = 20.08$
 $= 20 \text{ lightbulbs}$

Mark: 1 out of 2**Rationale:** Incorrect answer in Part A

Correct answer in Part B (follow-through error) (1 mark)

Exemplar 3

(2 marks)

A) $\frac{1}{250}$

B) $20:5000$

Mark: 2 out of 2**Rationale:** Correct answer in Part A (1 mark)

Correct answer in Part B (1 mark)

E4 (final answer not clearly indicated in Part B)

Question 12

E6.P.1

1 mark

The odds **against** hitting a deer on the highway each year are 49 : 1.

State the probability of hitting a deer this year.

Answer:

$\frac{1}{50}$ or 0.02 or 2% or one out of fifty

Note to marker: Accept equivalent representations.

Exemplar 1

(1 mark)

 2.04% **Mark: 0 out of 1****Rationale:** Incorrect answer**Exemplar 2**

(1 mark)

 50% **Mark: 0 out of 1****Rationale:** Incorrect answer

Vehicle Finance

Question 13

E5.V.1

2 marks

A car has a value of \$23 000. It depreciates at a rate of 20% per year.

Calculate the value of the car at the end of 2 years.

Answer:

$$\begin{aligned} \text{Value at end of 1st year: } & \$23\,000 \times 0.8 \\ & = \$18\,400 \end{aligned} \quad \leftarrow 1 \text{ mark}$$

$$\begin{aligned} \text{Value at end of 2nd year: } & \$18\,400 \times 0.8 \\ & = \$14\,720 \end{aligned} \quad \leftarrow 1 \text{ mark}$$

OR

Answer:

$$\begin{aligned} \text{Depreciation amount after 1st year: } & \$23\,000 \times 0.2 \\ & = \$4600 \end{aligned}$$

$$\begin{aligned} \text{Value at end of 1st year: } & \$23\,000 - \$4600 \\ & = \$18\,400 \end{aligned} \quad \leftarrow 1 \text{ mark}$$

$$\begin{aligned} \text{Depreciation amount after 2nd year: } & \$18\,400 \times 0.2 \\ & = \$3680 \end{aligned}$$

$$\begin{aligned} \text{Value at end of 2nd year: } & \$18\,400 - \$3680 \\ & = \$14\,720 \end{aligned} \quad \leftarrow 1 \text{ mark}$$

OR

Answer:

$$\begin{aligned} \text{Value at end of 2nd year: } & \$23\,000 \times (1 - 0.2)^2 \quad \leftarrow 1 \text{ mark} \\ & = \$14\,720 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(2 marks)

$$\begin{array}{l} \text{Yr 1} \quad 23000 \times 2 = 4600 \\ \quad \quad 23000 - 4600 = 184000 \\ \hline \text{Yr 2} \quad 184000 \times 2 = 3680 \\ \quad \quad 184000 - 3680 = 180320 \end{array}$$

Mark: 1 out of 2**Rationale:** Incorrect 1st year value

Correct 2nd year value (follow-through error) (1 mark)

E2 (does not include units in final answer)

Exemplar 2

(2 marks)

$$\begin{array}{l} \text{car value} = \$23000 \\ \text{1}^{\text{st}} \text{ year} = 23000 \times 0.20 = 4600 \\ \quad \quad 23000 - 4600 = 18400 \\ \text{2}^{\text{nd}} \text{ year} = 18400 \times 0.20 = 3680 \\ \quad \quad 18400 - 3680 = \$14720 \\ \text{end of 2 year car value is } = \$14720 \\ 23000 - 14720 = (8280) - \text{value down} \end{array}$$

Mark: 2 out of 2**Rationale:** Correct 1st year value (1 mark)

Correct 2nd year value (1 mark)

Exemplar 3

(2 marks)

$$\begin{array}{l} \frac{23000}{100} \times 20 \\ \quad \quad = 4600 \\ 18400 \text{ 1 year} \\ \\ \frac{18400}{100} \times 20 \\ \quad \quad = 3680 \\ 18400 - 3680 \\ \quad \quad = \underline{\underline{14720}} \end{array}$$

Mark: 2 out of 2**Rationale:** Correct 1st year value (1 mark)

Correct 2nd year value (1 mark)

E2 (does not include units in final answer)

Question 14

E5.V.1

4 marks

Saar wants to buy a new car for \$23 500 after taxes. He gets a 4-year loan at an annual interest rate of 6.75%.

A) Calculate the amount of interest paid for the first month. (2 marks)

Answer:

$$I = Prt$$

$$= \$23\,500 \times 0.0675 \times \frac{1}{12} \quad \leftarrow 1 \text{ mark for all correct substitutions}$$

$$= \$132.19 \quad \leftarrow 1 \text{ mark}$$

Note to marker: Award a mark for a follow-through error only if two of three correct substitutions are made.

B) Saar's monthly car payment is \$560.01.

Calculate the amount of interest paid over the life of the loan. (2 marks)

Answer:

$$\begin{aligned} \text{Total paid: } & \$560.01 \times 12 \times 4 \\ & = \$26\,880.48 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Total interest: } & \$26\,880.48 - \$23\,500 \\ & = \$3380.48 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(4 marks)

A) $23500 \div 12 \times 4 = 7833.\overline{33}$

B) 3380.64

Mark: 1 out of 4

Rationale: Incorrect substitution (interest rate) in Part A
 Correct final answer in Part A (follow-through error) (1 mark)
 E2 (does not include units in final answer in Part A)
 Incorrect answer in Part B
 E2 (does not include units in final answer in Part B)
 Note: No E2 deduction because no mark is awarded for this step.

Exemplar 2

(4 marks)

A) $23500 \times 0.0675 = 1586.25$

B) $1128000 - 23500 = \$1104500$

Mark: 2 out of 4

Rationale: Incorrect substitution (time) in Part A
 Correct answer in Part A (follow-through error) (1 mark)
 E2 (does not include units in final answer in Part A)
 Incorrect total paid in Part B
 Correct interest in Part B (follow-through error) (1 mark)

Exemplar 3

(4 marks)

A)
$$I = Prt$$

$$(\$23,500.00) \left(\frac{6.75}{100} \right) \left(\frac{4}{12} \right) \left(\overline{.33333} \right)$$

$$= \$528.75$$

B) $560.01 \times 48 = 26,880.48$

$$- 23,500$$

$$\hline 3,380.48$$

Mark: 3 out of 4

Rationale: Incorrect substitution (time) in Part A
 Correct answer in Part A (follow-through error) (1 mark)
 Two correct answers in Part B (2 marks)
 E2 (does not include units in final answer in Part B)

Question 15

E5.V.1

4 marks

Jersey wants to buy a used car from her friend, Jack. The price of the car is \$7000. She needs to fix a few things on the car.

Repairs	Total Cost
New Tires	\$500
Engine Tune-Up	\$110

The book value of the car is \$5000. She needs to get a lien search worth \$18 and a \$40 safety inspection before taxes.

Calculate the **total tax** she will pay for this car.

Answer:

$$\begin{aligned} \text{Repairs: } & (\$500 + \$110) \times 0.13 \\ & = \$79.30 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Safety inspection: } & \$40 \times 0.05 \\ & = \$2.00 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{PST: } & \$7000 \times 0.08 \\ & = \$560.00 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Total tax: } & \$79.30 + \$2.00 + \$560.00 \\ & = \$641.30 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

Note to marker: If the total cost (\$8309.30) is calculated instead of the total tax, award 3 marks.

Exemplar 1

(4 marks)

$$\begin{aligned} \text{cost a) } & 7000 \\ \text{book value b) } & 5000 \times 0.08 = 400 \\ \text{repair c) } & 40 \times 1.05 = 42 + 110 + 500 = 652 \\ \text{lien d) } & 18 \\ \text{total e) } & 7000 + 400 + 652 + 18 = 8072 \end{aligned}$$

Mark: 0 out of 4

Rationale: Did not calculate tax on repairs
 Incorrect tax on safety
 Incorrect PST
 Incorrect total tax

Exemplar 2

(4 marks)

$$\begin{aligned} 7600 \times 0.05 &= 380 \\ 40 \times 0.08 &= 3.2 \\ 610 \times 0.13 &= 79.3 \\ & \$ 432.5 \\ & + 10.4 + 19.2 \end{aligned}$$

Mark: 2 out of 4

Rationale: Incorrect PST
 Incorrect tax on safety
 Correct tax on repairs (1 mark)
 Correct final answer (follow-through error) (1 mark)
 E4 (does not express the answer to the appropriate number of decimal places)

Exemplar 3

(4 marks)

$$\begin{aligned} & \$7560 + \$118 + \$42 + \$5000 + \$565 + \\ & \quad \quad \quad \$124.3 \\ 7000(0.08) &= \$560 \\ 40(0.05) &= \$2 \\ 500(1.13) &= \$565 \\ 110(1.13) &= \$124.3 \\ \text{She will pay } & \$13309.30 \end{aligned}$$

Mark: 2 out of 4

Rationale: Incorrect tax on repairs
 Correct tax on safety (1 mark)
 Correct PST (1 mark)
 Incorrect total tax

Question 16

E5.V.1

1 mark

A retired couple drives 500 km each month to go to the dog park, the grocery store, and the mall.

State the type of car insurance policy their agent would recommend.

Answer:

pleasure

Note to marker: Award 1 mark if student refers to “pleasure” (e.g., for pleasure).



Question 17

E5.V.1

2 marks

Mabon was told by a dealership that his new car would use 5.5 L of fuel for every 100 km driven. In reality, the car is using 8 L of fuel for every 100 km he drives.

Calculate how much more fuel is used than expected if he drives 1500 km.

Answer:

Extra litres used per 100 km: $8 \text{ L}/100 \text{ km} - 5.5 \text{ L}/100 \text{ km}$

$$= 2.5 \text{ L}/100 \text{ km} \quad \leftarrow 1 \text{ mark}$$

Extra fuel used for 1500 km: $\frac{1500 \text{ km}}{100} \times 2.5 \text{ L}/100 \text{ km}$

$$= 37.5 \text{ L} \quad \leftarrow 1 \text{ mark}$$

OR**Answer:**

$$\begin{aligned} \text{Fuel consumption: } 1500 \text{ km} \times \frac{8 \text{ L}}{100 \text{ km}} \\ = 120 \text{ L} \end{aligned}$$

$$\begin{aligned} \text{Dealership's posted consumption: } 1500 \text{ km} \times \frac{5.5 \text{ L}}{100 \text{ km}} \\ = 82.5 \text{ L} \end{aligned}$$

$\left. \begin{array}{l} \\ \\ \end{array} \right\} \leftarrow 1 \text{ mark for correct calculation of either the car's consumption or the posted consumption}$

Extra fuel used for 1500 km: $120 - 82.5$

$$= 37.5 \text{ L} \quad \leftarrow 1 \text{ mark}$$

Exemplar 1

(2 marks)

$8 \times 15 = 120$ Litres of Fuel is used

$$1500 / 100 = 15$$

Mark: 1 out of 2**Rationale:** Correct process (1 mark)

Incorrect final answer

E2 (does not include units in final answer)

Note: No E2 deduction because no mark is awarded for this step.

Exemplar 2

(2 marks)

The Car would use an extra 37.5L of fuel
for 1500 km

Mark: 1 out of 2**Rationale:** No process shown

Correct answer (1 mark)

Exemplar 3

(2 marks)

$$2.5 \times 15 = 37.5 \text{ L}$$

Mark: 2 out of 2**Rationale:** Correct process (1 mark)

Correct answer (1 mark)

Question 18

E5.V.1

1 mark

Choose the letter that best completes the statement below.

Your car insurance premium is **not** affected by:

- A) moving to the city from the country
- B) changing the amount of deductible
- C) being in a demerit position on the Driver Safety Rating scale (DSR)
- D) changing the type of insurance

Answer: C)



Question 19

E5.V.1

3 marks

Jonas is purchasing a car. The following table shows the various details of his purchase.

Value of Car	\$23 000	Number of Payments	48
Tax	\$2990	Amount Borrowed	\$22 990
Down Payment	\$3000	Cost of Financing	\$1840

A) Calculate the total cost of the car after taxes and financing. (2 marks)

Answer:

$$\begin{array}{r} \text{Value of car:} \quad \$23\,000 \\ \text{Tax:} \quad \quad \quad \$2990 \\ \text{Cost of financing:} \quad \$1840 \\ \hline \text{Cost after financing:} \quad \$27\,830 \end{array} \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \leftarrow 1 \text{ mark}$$
$$\text{Cost after financing: } \$27\,830 \leftarrow 1 \text{ mark}$$

OR**Answer:**

$$\begin{array}{r} \text{Amount borrowed:} \quad \$22\,990 \\ \text{Down payment:} \quad \quad \$3000 \\ \text{Cost of financing:} \quad \quad \$1840 \\ \hline \text{Cost after financing:} \quad \$27\,830 \end{array} \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \leftarrow 1 \text{ mark}$$
$$\text{Cost after financing: } \$27\,830 \leftarrow 1 \text{ mark}$$

B) Jonas paid a total of \$24 830 in monthly car payments.

State the amount he paid each month. (1 mark)

Answer:

$$\begin{aligned} \text{Monthly payment} &= \frac{\$24\,830}{48} \\ &= \$517.29 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(3 marks)

A) $22\,990 + 3\,000 + 2\,990 + 1\,840$
 $= \$30\,820$

B)

Mark: 1 out of 3

Rationale: Incorrect process in Part A (1 additional value)
Correct answer in Part A (follow-through error) (1 mark)
No response in Part B

Exemplar 2

(3 marks)

A) $\$2\,7830$

B) 517.29

Mark: 2 out of 3

Rationale: No process shown
Correct answer in Part A (1 mark)
Correct answer in Part B (1 mark)
E2 (does not include units in final answer in Part B)

Exemplar 3

(3 marks)

A) $23\,000 + 2\,990 + 1\,840 = \$51\,290$

B) $24\,820 \div 4 \div 12 = \517.08

Mark: 2 out of 3

Rationale: Correct process in Part A (1 mark)
Incorrect answer in Part A
Correct answer in Part B (1 mark)
E3 (makes a transcription error in Part B) (total monthly payment)

Question 20

E5.V.1

2 marks

Wilma needs to get one of her car's headlights replaced. The headlight will cost \$200. It will take 1.5 hours of labour to replace the headlight at a rate of \$90 an hour.

Calculate the total cost, after taxes, of replacing the headlight.

Answer:

$$\begin{array}{l} \text{Labour: } 90 \times 1.5 \\ = \$135 \end{array}$$

$$\text{Parts: } \$200$$

$$\begin{array}{l} \text{Subtotal: } \$135 + \$200 \\ = \$335 \end{array}$$

$$\begin{array}{l} \text{Taxes: } \$335.00 \times 0.13 \\ = \$43.55 \end{array}$$

← 1 mark for process

$$\begin{array}{l} \text{Total cost: } \$335.00 + \$43.55 \\ = \$378.55 \end{array}$$

← 1 mark

Exemplar 1

(2 marks)

~~$$200 \times 1.13 = 226$$

$$90 \times 1.5 = 135$$~~

$$200 \times 1.13 = 226$$

Mark: 1 out of 2**Rationale:** Incorrect process

Correct final answer (follow-through error) (1 mark)

Exemplar 2

(2 marks)

$$\text{one head light} = 200$$

$$\text{one head light} = 200$$

$$= 400 \times 1.13$$

$$= 452$$

$$1.5 \times 90$$

$$= 135 \times 1.13$$

$$= 152.55$$

$$\text{Total} = 152.55 + 452$$

$$= 604.55$$

Mark: 1 out of 2**Rationale:** Incorrect process

Correct final answer (follow-through error) (1 mark)

Exemplar 3

(2 marks)

$$200 \times 1.13 = 226$$

$$1h = 90$$

$$.5 = 45$$

$$\begin{array}{r} 226 \\ 96 \\ 45 \\ \hline 361 \end{array}$$

$$\boxed{361}$$

Mark: 1 out of 2**Rationale:** Incorrect process

Correct final answer (follow-through error) (1 mark)

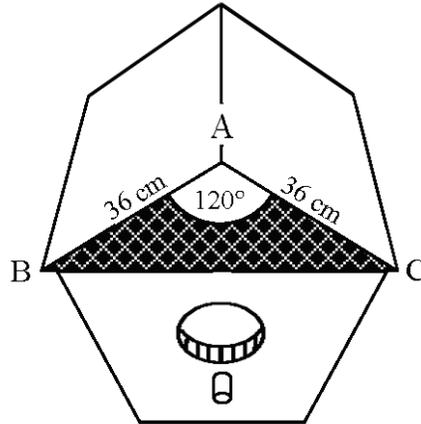
Geometry and Trigonometry

Question 21

E6.G.2

2 marks

A community group is building bird houses.



A) State the type of triangle that is shaded in the diagram. (1 mark)

Sample answers:

- isosceles
- obtuse

B) State the measure of $\angle C$ in triangle ABC. (1 mark)

Answer:

$$\begin{aligned}\angle C &= \frac{180^\circ - 120^\circ}{2} \\ &= 30^\circ \quad \leftarrow 1 \text{ mark}\end{aligned}$$

Exemplar 1

(2 marks)

A) Obtuse
Angle A is greater than 90

B)

$$a^2 = 36^2 + 36^2 - 2(36)(36) \cos 120$$
$$a^2 = 2592 - 2(36)(36) \cos 120$$
$$\sqrt{a^2} = \sqrt{3888}$$
$$a = 62.3$$
$$\frac{\sin 120}{62.3} = \frac{\sin C}{36}$$
$$C = 30.02^\circ$$

Mark: 2 out of 2**Rationale:** Correct answer in Part A (1 mark)

Correct answer in Part B (1 mark)

E1 (rounds too soon in Part B)

Exemplar 2

(2 marks)

A) Obtuse

B)

$$120 - 180 = 60$$
$$60 \div 2 = 30$$
$$\angle C = 30$$

Mark: 2 out of 2**Rationale:** Correct answer in Part A (1 mark)

Correct answer in Part B (1 mark)

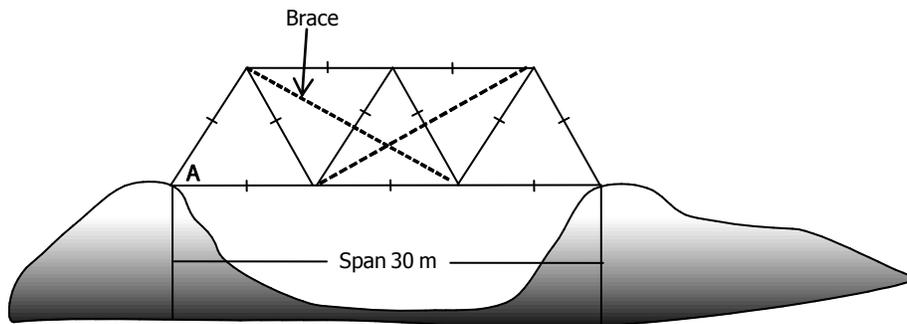
E2 (does not include units in final answer in Part B)

Question 22

E6.G.1

3 marks

Bartholomew is solving a math problem involving a truss bridge. The 30 metre bridge is made of 5 equilateral triangles of the same size and has 2 braces as shown in the diagram.



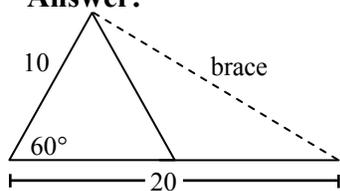
A) State the measure of angle A. (1 mark)

Answer:

$$\begin{aligned}\angle A &= \frac{180^\circ}{3} \\ &= 60^\circ \leftarrow 1 \text{ mark}\end{aligned}$$

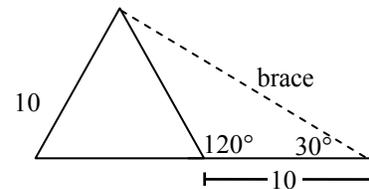
B) Calculate the length of the brace. (2 marks)

Answer:



OR

Answer:



$$a^2 = b^2 + c^2 - (2bc \cos A)$$

$$a^2 = 10^2 + 20^2 - (2(10)(20)\cos 60^\circ)$$

$$a^2 = 100 + 400 - (400 \cos 60^\circ)$$

$$a^2 = 300$$

$$a = \sqrt{300}$$

$$a = 17.32 \text{ m}$$

$\leftarrow 1 \text{ mark for process} \rightarrow$

$$\begin{cases} \frac{\text{brace}}{\sin 120^\circ} = \frac{10}{\sin 30^\circ} \\ \text{brace} = \frac{10(\sin 120^\circ)}{\sin 30^\circ} \end{cases}$$

$\leftarrow 1 \text{ mark} \rightarrow$

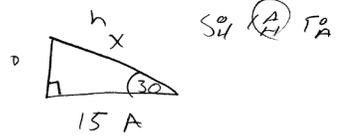
$$\text{brace} = 17.32 \text{ m}$$

Note to marker: Accept equivalent solutions.

Exemplar 1

(3 marks)

A)  $\sin(A) = \frac{h}{r}$
 $\cos \theta = \frac{5}{10}$
 $\theta = 60^\circ$
 angle A = 60°

B)  $\sin(A) = \frac{h}{r}$
 $\cos 30^\circ = \frac{15}{x}$
 $\frac{15}{\cos 30^\circ} = 17.32 \text{ cm}$
 The length of the brace is 17.32 cm.

Mark: 3 out of 3**Rationale:** Correct answer in Part A (1 mark)

Correct answer in Part B (2 marks)

E2 (uses incorrect units of measure in Part B)

Exemplar 2

(3 marks)

A) $\frac{180}{3} = 60^\circ = \angle A$

B) $\frac{\sin 60}{10} = \frac{\sin 40}{x}$
 $x = 11.5 \text{ m}$

$\frac{\sin 30}{y} = \frac{\sin 20}{10}$
 $y = 5.77 \text{ m}$

$x + y$
 $11.5 \text{ m} + 5.77 \text{ m} = 17.27 \text{ m}$
 Each brace is 17.3 m long

Mark: 3 out of 3**Rationale:** Correct answer in Part A (1 mark)

Correct answer in Part B (2 marks)

E1 (rounds too soon in Part B)

E4 (does not express the answer to the appropriate number of decimal places)

Exemplar 3

(3 marks)

A) angle A = 60°

B) $\sin 60 = \frac{x}{10} = 8.6 \times 2$

length of brace is 17.3 m long

Mark: 3 out of 3

Rationale: Correct answer in Part A (1 mark)

Correct answer in Part B (2 marks)

E4 (does not express the answer to the appropriate number of decimal places)

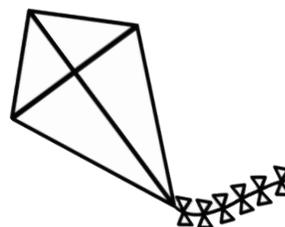
Question 23

E6.G.2

1 mark

Identify which of the following is a property of a kite:

- A) the lengths of the opposite sides are congruent
- B) opposite angles are congruent
- C) diagonals are congruent
- D) diagonals intersect at 90°



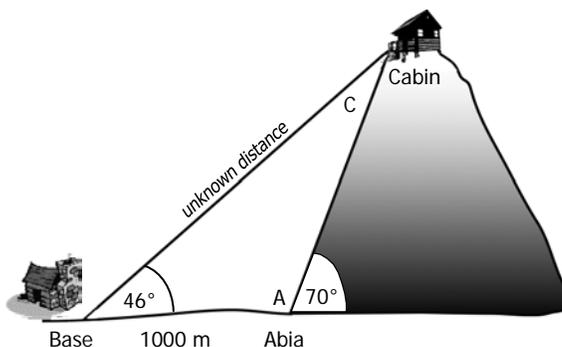
Answer: D)

Question 24

E6.G.1

5 marks

Abia is measuring the distance a gondola travels between the base and the cabin at the top of the mountain. The angle of elevation from the base to the cabin is 46° . The angle of elevation from Abia to the cabin is 70° .



A) Calculate the measures of angle A and angle C. (2 marks)

Answer:

$$\begin{aligned}\angle A &= 180^\circ - 70^\circ \\ &= 110^\circ \quad \leftarrow 1 \text{ mark}\end{aligned}$$

$$\begin{aligned}\angle C &= 180^\circ - (46^\circ + 110^\circ) \text{ or } 180^\circ - 46^\circ - 110^\circ \\ &= 24^\circ \quad \leftarrow 1 \text{ mark}\end{aligned}$$

B) Determine the distance between the base and the cabin if Abia is 1000 m from the base. (3 marks)

Answer:

$$\begin{aligned}\frac{\sin A}{a} &= \frac{\sin C}{c} && \leftarrow 1 \text{ mark for sine law} \\ \frac{\sin 110^\circ}{a} &= \frac{\sin 24^\circ}{1000} \\ a &= \frac{1000 (\sin 110^\circ)}{\sin 24^\circ} && \leftarrow 1 \text{ mark for process} \\ a &= 2310.32 \text{ m} && \leftarrow 1 \text{ mark}\end{aligned}$$

Exemplar 1

(5 marks)

$$\angle A = 180 - 70 = 110^\circ$$

A)

$$\angle C = 180 - 46 - 110 = 24^\circ$$

B)

$$\frac{\sin 24}{1000} = \frac{\sin 110}{x}$$

$$(\sin 24)(x) = (\sin 110)(1000)$$

$$(\sin 24)(x) = 939.69$$

$$x = 2310.52 \text{ m}$$

Mark: 4 out of 5**Rationale:** Correct answers in Part A (2 marks)

Correct use of sine law in Part B (1 mark)

Correct process in Part B (1 mark)

Incorrect final answer in Part B

Exemplar 2

(5 marks)

A)

$$180 - 70 = 110^\circ$$

$$\angle A = 110^\circ$$

$$\angle C = 180 - 46 - 110 = 24^\circ$$

B)

$$\frac{1000}{\sin 24} = \frac{x}{\sin 46}$$

$$(1000)(\sin 46) = x(\sin 24)$$

$$\frac{719}{\sin 24} = \frac{x(\sin 24)}{\sin 24}$$

$$1767.728$$

$$1767.73 \text{ m}$$

$$\frac{1767.73}{\sin 46} = \frac{x}{\sin 110}$$

$$(1767.73)(\sin 110) = x(\sin 46)$$

$$\frac{1661.1}{\sin 46} = \frac{x(\sin 46)}{\sin 46}$$

2309.2 m is the unknown distance.

Mark: 5 out of 5**Rationale:** Correct answers in Part A (2 marks)

Correct answer in Part B (follow-through error) (3 marks)

E1 (rounds too soon in Part B)

E4 (does not express the final answer to the appropriate number of decimal places)

Exemplar 3

(5 marks)

A) $180 - 70 = \frac{110}{110}$ $180 - \frac{110}{110} - 76 = \frac{240}{240}$

$$A = \frac{110}{110} 110^\circ$$

$$C = \frac{240}{240} 240^\circ$$

B) $\frac{\sin \frac{110}{110}}{a} = \frac{\sin \frac{240}{1000}}{1000}$

$$a = 2310 \text{ m}$$

Mark: 5 out of 5**Rationale:** Correct answers in Part A (2 marks)

Correct answer in Part B (3 marks)

E4 (does not express the final answer to the appropriate number of decimal places)

Question 25

E6.G.2

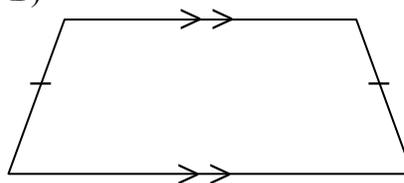
1 mark

Identify which of the following diagrams best illustrates an isosceles trapezoid.

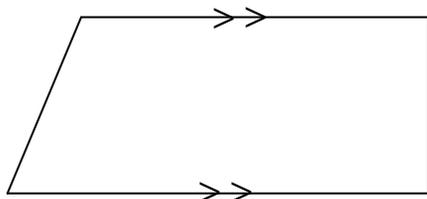
A)



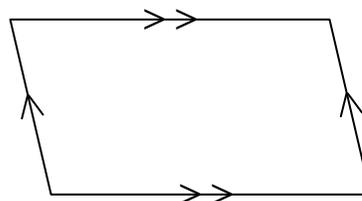
B)



C)



D)



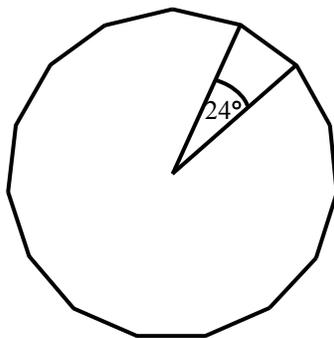
Answer: B

Question 26

E6.G.2

1 mark

An engineer is designing a building in the form of a regular polygon that has a central angle of 24° .



She is using the formula $S = \frac{64\,800}{C} - 360^\circ$, where S is the sum of the interior angles of a polygon and C is the central angle of the regular polygon.

State the sum of the interior angles of the polygon.

Answer:

$$\begin{aligned} S &= \frac{64\,800}{C} - 360^\circ \\ &= \frac{64\,800}{24^\circ} - 360^\circ \\ &= 2700^\circ - 360^\circ \\ &= 2340^\circ \end{aligned}$$

← 1 mark

OR**Answer:**

$$\begin{aligned} C &= \frac{360^\circ}{n} \\ 24^\circ &= \frac{360^\circ}{n} \\ n &= 15 \end{aligned}$$

$$S = 180^\circ(n - 2)$$

$$S = 2340^\circ$$

← 1 mark

Exemplar 1

(1 mark)

$$(180)(15-2) \div 15$$

$$= 156^\circ$$

Mark: 0 out of 1**Rationale:** Incorrect answer**Exemplar 2**

(1 mark)

$$\left(\frac{64800}{24}\right) - 360 = 2340$$

Mark: 1 out of 1**Rationale:** Correct answer (1 mark)

E2 (does not include units in final answer)

Exemplar 3

(1 mark)

$$S = 180^\circ(15-2)$$

sum of interior angles is

$$\boxed{2340}$$

Mark: 1 out of 1**Rationale:** Correct answer (1 mark)

E2 (does not include units in final answer)

Precision Measurement

Question 27

E5.P.1

1 mark

Leanne measures her height to be 168 cm.

State the uncertainty of the measurement.

Do not round the final answer.

Uncertainty: _____

Answer:

Uncertainty: _____ ± 0.5 cm

Note to marker: \pm not required.

Exemplar 1

(1 mark)

Uncertainty: 168 ± 0.5cm**Mark: 1 out of 1****Rationale:** Correct uncertainty (1 mark)

E4 (too much information is presented in the answer)

Exemplar 2

(1 mark)

Uncertainty: 5 mm**Mark: 1 out of 1****Rationale:** Correct uncertainty (1 mark)**Exemplar 3**

(1 mark)

Uncertainty: Half a
centimeter**Mark: 1 out of 1****Rationale:** Correct uncertainty (1 mark)

Question 28

E5.P.1

1 mark

Explain why a pharmacist must use accurate dosages when preparing medications.

Sample answers:

- A pharmacist must be accurate so the medication can be most effective.
- A pharmacist must be accurate to prevent an overdose.
- A pharmacist must be accurate to ensure a sufficient quantity of medication (to prevent an under dose).
- The pharmacy would lose money if extra medication was dispensed.

Exemplar 1

(1 mark)

You don't want to give too little pills so it doesn't solve the problem, and too many will allow your body to get used to the drug and it won't have the same effect anymore.

Mark: 0 out of 1**Rationale:** Incorrect answer**Exemplar 2**

(1 mark)

A pharmacist must be accurate when preparing medications because they must take into account the actual measured value compared to the real value.

Mark: 0 out of 1**Rationale:** Incorrect response**Exemplar 3**

(1 mark)

He or she must be accurate because if you do much when preparing meds you could make that person have an overdose so you need to be accurate.

Mark: 1 out of 1**Rationale:** Correct response (1 mark)

Question 29

E5.S.1

2 marks

Given the following measurement:

$$56.0 \pm 0.3 \text{ mm}$$

A) State the minimum value. Do not round the final answer. (1 mark)

Answer:

55.7 mm

B) State the tolerance of the measurement. Do not round the final answer. (1 mark)

Answer:

0.6 mm

Exemplar 1

(2 marks)

A) 55.7 mm

B) 0.3 mm \pm **Mark: 1 out of 2****Rationale:** Correct answer in Part A (1 mark)

Incorrect answer in Part B

Exemplar 2

(2 marks)

A) 55.7 mm

B) tolerance = ~~0.3 mm~~
+ .3
- .3**Mark: 1 out of 2****Rationale:** Correct answer in Part A (1 mark)

Incorrect answer in Part B

E2 (does not include units in final answer in Part B)

Note: No E2 deduction because no mark is awarded for this step.

Exemplar 3

(2 marks)

A) 55.7

B) 56.3

Mark: 1 out of 2**Rationale:** Correct answer in Part A (1 mark)

E2 (does not include units in final answer)

Incorrect answer in Part B

E2 (does not include units in final answer)

Note: No E2 deduction because no mark is awarded for this step.

Question 30

E5.P.1

1 mark

Three of the four forms of tolerance listed below indicate the same measurement in megahertz.

Choose the form of tolerance that indicates a different measurement.

A) 16 ± 0.3 MHz

B) $\begin{matrix} 16.3 \\ 15.7 \end{matrix}$ MHz

C) $15.7 \begin{matrix} +0.3 \\ -0.3 \end{matrix}$ MHz

D) $15.7 \begin{matrix} +0.6 \\ 0 \end{matrix}$ MHz

Answer: C)



Question 31

E5.P.1

2 marks

The recommended oil capacity of an engine has a maximum volume of 52.5 mL and a minimum volume of 47.5 mL.

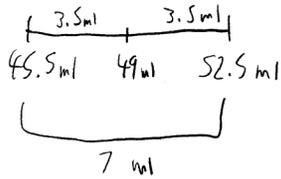
State the measurement in the form: nominal value $\pm \frac{1}{2}$ (tolerance).

Answer:

$\underbrace{50}$	\pm	$\underbrace{2.5 \text{ mL}}$
1 mark		1 mark
for		for
nominal		half
value		tolerance

Exemplar 1

(2 marks)



$$\frac{1}{2} \text{ tolerance} = 3.5 \text{ ml}$$

$$\text{nominal value} = 49 \text{ ml}$$

Mark: 2 out of 2**Rationale:** Correct answers (follow-through error) (2 marks)

E3 (makes a transcription error)

Exemplar 2

(2 marks)

$$\begin{aligned} \text{max} &= 52.5 - 2.5 = 50 & 50 & \begin{array}{l} + 2.5 \\ - 2.5 \end{array} \\ \text{min} &= 47.5 + 2.5 = 50 \\ \hline & 5 \div 2 = 2.5 \end{aligned}$$

Mark: 2 out of 2**Rationale:** Correct answers (2 marks)

E2 (does not include units in final answer)

Exemplar 3

(2 marks)

$$\begin{aligned} \text{Tol} &= 5 \\ \text{nom} &= 50 \end{aligned}$$

$$50 \pm \frac{1}{2}(5)$$

Mark: 2 out of 2**Rationale:** Correct answers (2 marks)

E2 (does not include units in final answer)

Question 32

E5.P.1

1 mark

Explain why the tolerance of an oven's temperature needs to be considered when baking a cake for 30 minutes.

Sample answers:

- There is a range of acceptable temperatures so that the cake will not be underdone.
- There is a range of acceptable temperatures so that the cake will not be overdone.

Exemplar 1

(1 mark)

Baking is a science so if you're baking a cake and the instructions say "30 minutes", it's not smart to put it in for any less/more time or else the tolerance will be off and so will the cake.

Mark: 0 out of 1**Rationale:** Incorrect response (refers to time not temperature)**Exemplar 2**

(1 mark)

If your tolerance is too high your cake could burn and if it's too low your cake won't cook at all.

Mark: 0 out of 1**Rationale:** Incorrect response**Exemplar 3**

(1 mark)

because usually an oven goes
up by 5 so the tolerance
could be $+5$
 -5

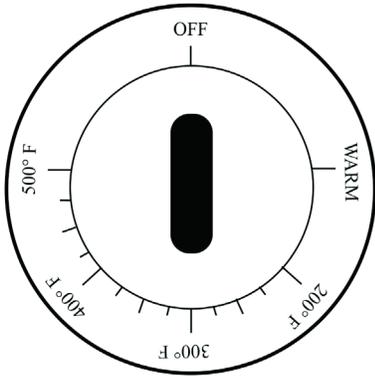
Mark: 0 out of 1**Rationale:** Incorrect response

Question 33

E5.P.1

1 mark

State the precision of the oven dial.

**Answer:**

25° F

Exemplar 1

(1 mark)

$$\pm 25^{\circ}$$

Mark: 0 out of 1**Rationale:** Incorrect response

E2 (uses incorrect units of measure)

Note: No E2 deduction because no mark is awarded for this step.

Exemplar 2

(1 mark)

25° is the smallest unit
of measurement.

Mark: 1 out of 1**Rationale:** Correct answer (1 mark)

E2 (uses incorrect units of measure)

Statistics

Question 34

E5.S.1

3 marks

Doug is a welder who is looking for employment. Hourly rates for available jobs are shown in the table below:

\$22.50	\$29.50	\$18.50	\$26.75	\$26.75	\$17.59	\$26.75
\$26.75	\$28.25	\$17.50	\$24.25	\$18.50	\$24.00	\$26.75

A) State the mean hourly rate. (1 mark)

Answer:

$$\begin{aligned} \text{Mean: } & \frac{\$334.34}{14} \\ & = \$23.88 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

B) State the mode of the hourly rate. (1 mark)

Answer:

Mode: \$26.75

C) Explain why the mode may be a better indicator than the mean of the hourly rate Doug could expect. (1 mark)

Answer:

The mode is the most common hourly rate.

Exemplar 1

(3 marks)

A)

\$22.50 4	\$29.50 9	\$18.50 3	\$26.75 7	\$26.75 7	\$17.59 2	\$26.75 7
\$26.75 7	\$28.25 8	\$17.50 7	\$24.25 6	\$18.50 3	\$24.00 5	\$26.75 7

add together $\div 14 = 23.9$

B) 26.50

C) because it's the most used #

Mark: 2 out of 3**Rationale:** Correct answer in Part A (1 mark)

E2 (does not include units in final answer in Part A)

E4 (does not express the answer to the appropriate number of decimal places in Part A)

Incorrect answer in Part B

E2 (does not include units in final answer in Part B)

Note: No E2 deduction because no mark is awarded for this step.

Correct answer in Part C (1 mark)

Exemplar 2

(3 marks)

A) \$23.07/h

B) \$26.75/h

C) The mode is better because the mean uses the low rates which makes the mean lower

Mark: 1 out of 3**Rationale:** Incorrect answer in Part A

Correct answer in Part B (1 mark)

Incorrect answer in Part C

Exemplar 3

(3 marks)

A) \$ 23.95

B) 26.75

C) because more employees are making 26.75
than other wages**Mark: 2 out of 3****Rationale:** Incorrect answer in Part A

Correct answer in Part B (1 mark)

E2 (does not include units in final answer in Part B)

Correct answer in Part C (1 mark)

E2 (does not include units in final answer in Part C)



Question 35

E5.S.2

2 marks

The table below indicates the hours (per week) that each student in a band practices their instrument:

Practice	
Student	Hours per Week
Anna	0.25
Beth	2.5
Cassie	3.0
Dave	0.5
Ed	1.5
Fiona	1.25
Gordon	1.75
Hanna	2.0

Calculate Beth's percentile rank for the time she spends practising her instrument.

Answer:

$$\begin{aligned} PR &= \frac{b}{n} \times 100 \\ &= \frac{6}{8} \times 100 \\ &= 75 \end{aligned}$$

← 1 mark for all correct substitutions

∴ 75 or 75th or PR_{75} ← 1 mark

Exemplar 1

(2 marks)

$$PR = (2.5 \div 8) \times 100$$

$$PR = 31\%$$

Mark: 1 out of 2**Rationale:** Incorrect substitution

Correct answer (follow-through error) (1 mark)

Exemplar 2

(2 marks)

$$\left(\frac{B + 0.5 \cdot E}{n} \right) \cdot 100$$

$$\left(\frac{7 + 0.5 \cdot 1}{8} \right) \cdot 100 = 93.75$$

She is in the 94th percentile rank.**Mark: 1 out of 2****Rationale:** Incorrect substitution

Correct answer (follow-through error) (1 mark)

Exemplar 3

(2 marks)

$$PR = \frac{b}{n} \times 100$$

$$PR = \frac{5}{8} \times 100 = 62.50$$

62.50th percentile.**Mark: 1 out of 2****Rationale:** Incorrect substitution

Correct answer (follow-through error) (1 mark)

E5 (does not use whole units in contextual questions involving discrete data)

Question 36

E5.S.1

1 mark

Choose the letter that best completes the statement below.

Removing a high outlier:

- A) increases the mean
- B) lowers the mean
- C) has no effect on the mean
- D) increases the median

Answer: B)



Question 37

E5.S.1

2 marks

The test results from Jeremy's Statistics course are listed below.

Test Results	50%	65%	70%	95%	40%	55%
--------------	-----	-----	-----	-----	-----	-----

His final grade in the course will be calculated using a trimmed mean.

Calculate Jeremy's final grade after eliminating his highest and lowest test mark.

Answer:

$$\begin{aligned}\text{Trimmed total: } & 50 + 55 + 65 + 70 \\ & = 240\end{aligned}$$

Number of marks remaining after trim: 4

$$\begin{aligned}\text{Trimmed mean: } & \frac{240}{4} && \leftarrow 1 \text{ mark for process} \\ & = 60\% && \leftarrow 1 \text{ mark}\end{aligned}$$

Exemplar 1

(2 marks)

Test Results	50%	65%	70%	85%	90%	55%	= $\frac{240}{5}$
--------------	-----	-----	-----	----------------	----------------	-----	-------------------

$= 48\%$

Mark: 1 out of 2**Rationale:** Incorrect process

Correct answer (follow-through error) (1 mark)

Exemplar 2

(2 marks)

Test Results	50%	65%	70%	95%	40%	55%
--------------	-----	-----	-----	-----	-----	-----

$$\frac{65 + 70 + 95}{3} = 76.66$$

Mark: 1 out of 2**Rationale:** Incorrect process

Correct answer (follow-through error) (1 mark)

E1 (rounds incorrectly)

E2 (does not include units in final answer)

Exemplar 3

(2 marks)

Outliers - 40, 95

Trimmed mean - 60

Mark: 1 out of 2**Rationale:** No process shown

Correct answer (1 mark)

E2 (does not include units in final answer)

Question 38

E5.S.1

3 marks

Megan is taking a Psychology class at university. The table below shows her marks and their corresponding weights.

Category	Average Mark (%)	Weight (%)
Projects	75	10
Assignments	85	30
Tests	73	40
Exam	?	20

Calculate the mark Megan needs on her final exam to receive a final mark of 80%.

Answer:

$$\begin{array}{l} \text{Projects:} \quad 75 \times 0.10 = 7.5 \\ \text{Assignments:} \quad 85 \times 0.30 = 25.5 \\ \text{Tests:} \quad 73 \times 0.40 = \underline{29.2} \end{array} \left. \vphantom{\begin{array}{l} \text{Projects:} \\ \text{Assignments:} \\ \text{Tests:} \end{array}} \right\} \leftarrow 1 \text{ mark for process}$$
$$\text{Subtotal:} \quad 62.2 \quad \leftarrow 1 \text{ mark}$$

$$\begin{aligned} \text{Exam mark: } & \frac{(80 - 62.2)}{20} \times 100 \\ & = 89\% \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(3 marks)

$$\frac{75}{\times .1} = 7.5 \quad + \quad \frac{85}{\times .3} = 25.5 \quad + \quad \frac{73}{\times .4} = 29.2 \quad = 62.2$$

$$\frac{90}{\times .2} = 18$$

$$62.2 + 18 = 80.2 \%$$

Mark: 2 out of 3

Rationale: Correct process (1 mark)
 Correct subtotal (1 mark)
 Incorrect exam mark

Exemplar 2

(3 marks)

$$\begin{aligned} \text{Project} &= 7.5 \\ \text{Assignment} &= 25.5 \\ \text{Test} &= 29.2 \end{aligned} \quad \begin{aligned} &= \frac{80}{17.8} \div .2 = 89 \end{aligned}$$

Megan needs 89 on her final exam to get a final mark of 80

Mark: 3 out of 3

Rationale: Correct answer (3 marks)
 E2 (does not include units in final answer)



Appendices

Appendix A: Table of Questions by Unit and Learning Outcome

Home Finance		
Question	Learning Outcome	Mark
1	E.6.H.1	2
2	E.6.H.1	1
3	E.6.H.1	2
4	E.6.H.1	2
5	E.6.H.1	1
6	E.6.H.1	3
7	E.6.H.1	2
		Total = 13
Probability		
Question	Learning Outcome	Mark
8	E6.P.1	2
9 a)	E6.P.1	1
9 b)	E6.P.1	1
10	E6.P.1	3
11 a)	E6.P.1	1
11 b)	E6.P.1	1
12	E6.P.1	1
		Total = 10
Vehicle Finance		
Question	Learning Outcome	Mark
13	E5.V.1	2
14 a)	E5.V.1	2
14 b)	E5.V.1	2
15	E5.V.1	4
16	E5.V.1	1
17	E5.V.1	2
18	E5.V.1	1
19 a)	E5.V.1	2
19 b)	E5.V.1	1
20	E5.V.1	2
		Total = 19

Geometry and Trigonometry		
Question	Learning Outcome	Mark
21 a)	E6.G.2	1
21 b)	E6.G.2	1
22 a)	E6.G.1	1
22 b)	E6.G.1	2
23	E6.G.2	1
24 a)	E6.G.1	2
24 b)	E6.G.1	3
25	E6.G.2	1
26	E6.G.2	1
		Total = 13
Precision Measurement		
Question	Learning Outcome	Mark
27	E5.P.1	1
28	E5.P.1	1
29 a)	E5.P.1	1
29 b)	E5.P.1	1
30	E5.P.1	1
31	E5.P.1	2
32	E5.P.1	1
33	E5.P.1	1
		Total = 9
Statistics		
Question	Learning Outcome	Mark
34 a)	E5.S.1	1
34 b)	E5.S.1	1
34 c)	E5.S.1	1
35	E5.S.2	2
36	E5.S.1	1
37	E5.S.1	2
38	E5.S.1	3
		Total = 11

Appendix B: Irregularities in Provincial Tests

A Guide for Local Marking

During the marking of provincial tests, irregularities are occasionally encountered in test booklets. The following list provides examples of irregularities for which an *Irregular Test Booklet Report* should be completed and sent to the department:

- completely different penmanship in the same test booklet
- incoherent work with correct answers
- notes from a teacher indicating how he or she has assisted a student during test administration
- student offering that he or she received assistance on a question from a teacher
- student submitting work on unauthorized paper
- evidence of cheating or plagiarism
- disturbing or offensive content
- no responses provided by the student (all “NR”) or only incorrect responses (“0”)

Student comments or responses indicating that the student may be at personal risk of being harmed or of harming others are personal safety issues. This type of student response requires an immediate and appropriate follow-up at the school level. In this case, please ensure the department is made aware that follow-up has taken place by completing an *Irregular Test Booklet Report*.

Except in the case of cheating or plagiarism where the result is a provincial test mark of 0%, it is the responsibility of the division or the school to determine how they will proceed with irregularities. Once an irregularity has been confirmed, the marker prepares an *Irregular Test Booklet Report* documenting the situation, the people contacted, and the follow-up. The original copy of this report is to be retained by the local jurisdiction and a copy is to be sent to the department along with the test materials.

Irregular Test Booklet Report

Test: _____

Date marked: _____

Booklet No.: _____

Problem(s) noted: _____

Question(s) affected: _____

Action taken or rationale for assigning marks: _____

Follow-up: _____

Decision: _____

Marker's Signature: _____

Principal's Signature: _____

<p>For Department Use Only—After Marking Complete</p> <p>Consultant: _____</p> <p>Date: _____</p>
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Appendix C:

Communications Errors

Communication Errors

Communication errors are errors not conceptually related to the learning outcomes associated with the question. The following communication errors will result in a 0.5 mark deduction. Each error can only be deducted once per test and is tracked in a separate section on the *Scoring Sheet*.

The total mark deduction for communication errors for any student response is not to exceed the marks awarded for that response. For example, there would be no communication error deductions if no marks were awarded for a given response.

E1 (Rounding)

- rounds incorrectly
- rounds too soon

E2 (Units)

- uses incorrect units of measure
- does not include units in final answer
(e.g., missing \$ for monetary values, missing % for GDSR, missing degrees for angles)

E3 (Transcription/Transposition)

- makes a transcription error (inaccurate transferring of information)
- makes a transposition error (changing order of digits)

E4 (Final Answer)

- final answer not clearly indicated
(e.g., $\frac{3}{4}$ and 3:1 presented, but final answer not indicated)
- answer is presented in another part of the question
- does not express the answer to the appropriate number of decimal places
(e.g., monetary values are not expressed to two decimal places)
- too much information is presented in the answer

E5 (Whole Units)

- does not use whole units in contextual questions involving discrete data
(e.g., people, cans of paint, percentile rank)

