

Grade 12
Essential Mathematics
Achievement Test

Marking Guide

January 2019

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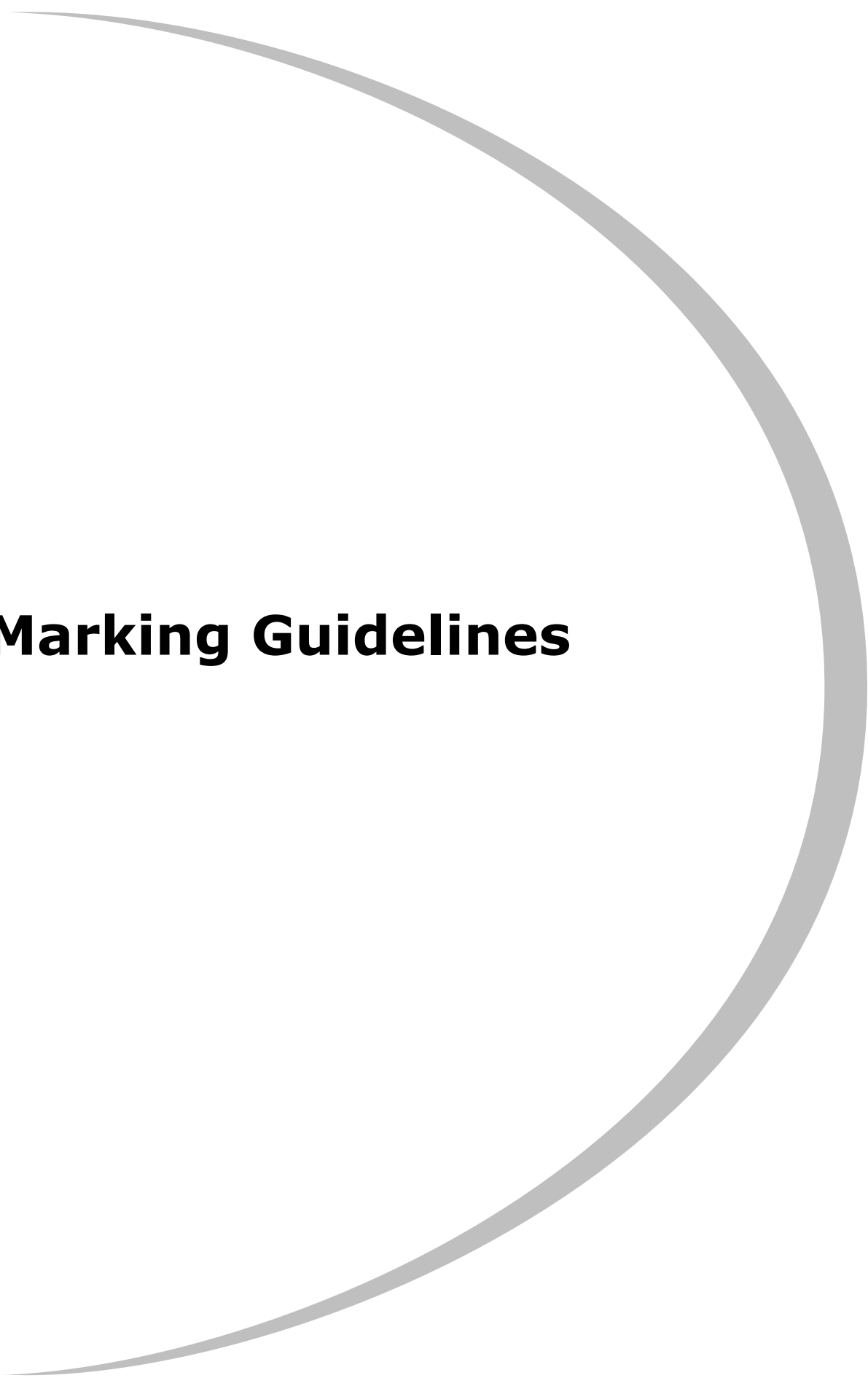
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While the department is committed to making its publications as accessible as possible, some parts of this document are not fully accessible at this time.

Available in alternate formats upon request.

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Marking Guidelines

General Marking Instructions

The *Grade 12 Essential Mathematics Achievement Test: Marking Guide (January 2019)* 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 E6 errors (0.5 mark deduction).

COMMUNICATION ERRORS/ERREURS DE COMMUNICATION					
Shade in the circles below for a maximum total deduction of 3 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 3 points (déduction de 0,5 point par type d’erreur). Consultez le <i>Guide de Correction</i> pour plus de détails.		
E1 ☒	E2 ☐	E3 ☐	E4 ☐	E5 ☐	E6 ☒
Final Answer/ Réponse finale	Notation	Transcription/ Transposition	Whole Units/ Unités entières	Units/ Unités	Rounding/ Arrondissement

Test mark / Note au test :	56	–	1	=	55
	Preliminary Mark Note préliminaire		Communication Errors (maximum 3 marks) Erreurs de communication (maximum 3 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” 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

4 marks

Jen and Joe are purchasing a house. Their monthly property taxes will be \$160, their monthly heating costs will be \$122, and their monthly mortgage payment will be \$1445. Their combined gross income per year is \$66 000.

A) Calculate their Gross Debt Service Ratio (GDSR) as a percent. (3 marks)

Answer:

$$\begin{aligned}\text{Gross monthly income: } & \$66\,000 \div 12 \\ & = \$5500\end{aligned}$$

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

$$= \frac{(\$1445 + \$160 + \$122)}{\$5500}$$

$$= 0.314$$

$$= 31.4\%$$

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

← 1 mark

B) Justify why Jen and Joe might consider purchasing a less expensive house. (1 mark)

Sample Answer:

– Even though their GDSR is below 32%, it is very close to 32% and they may have trouble budgeting for their other expenses.

Exemplar 1

(4 marks)

- A) $66000 \div 12 = 5500$
$$\frac{1445 + 122 + 160}{5500} = 0.314\%$$
- B) Jen & Joe should get a less expensive house because they Just make it to be liable for a mortgage.

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

Incorrect final answer in Part A

Insufficient response in Part B

Exemplar 2

(4 marks)

- A)
$$\frac{1445 + 160 + 122}{66000} = 0.03$$
 E2
- B) Because there under the expected value

Mark: 2 out of 4**Rationale:** 3 correct substitutions in Part A (1 mark)

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

E2 (answer expressed in an alternative form than requested)

Incorrect response in Part B

A)
$$\frac{1445 + 122 + 160}{5500}$$

$$= 0.31$$
 E2

B) BECAUSE THEY ARE AT 31%

Mark: 3 out of 4

Rationale: Correct substitutions in Part A (2 marks)

Correct final answer in Part A (1 mark)

E2 (answer expressed in an alternative form than requested)

Insufficient response in Part B



Question 2

E6.H.1

2 marks

Chris is purchasing a parcel of land valued at \$87 500 to build a house. The land transfer tax is calculated as follows:

Land Transfer Tax Table	
Value of Property	Rate
On the first \$30 000	0%
On the next \$60 000 (i.e., \$30 001 to \$90 000)	0.5%
On the next \$60 000 (i.e., \$90 001 to \$150 000)	1.0%
On the next \$50 000 (i.e., \$150 001 to \$200 000)	1.5%
On amounts in excess of \$200 000	2.0%

Calculate the total land transfer tax due. (2 marks)

Answer:

Tax on first \$30 000: \$0

$$\left. \begin{array}{l} \$87\,500 - \$30\,000 \\ = \$57\,500 \end{array} \right\} \quad \leftarrow 1 \text{ mark}$$

$$\begin{array}{l} \text{Tax on next } \$57\,500: \$57\,500 \times 0.005 \\ = \$287.50 \end{array} \quad \leftarrow 1 \text{ mark}$$

$$\begin{array}{l} \text{Land transfer tax due: } \$0 + \$287.50 \\ = \$287.50 \end{array}$$

Note to marker: Student does not need to show $\$0 + \287.50 .

Exemplar 1

(2 marks)

$$0.5 \times 87\,500 = 43\,750$$

Mark: 0 out of 2**Rationale:** Incorrect taxable amount
Incorrect final answer**Exemplar 2**

(2 marks)

$$30,000 \times 0.0 = \$0$$

$$57,500 \times 0.05 = \$ \underline{2875}$$

Mark: 1 out of 2**Rationale:** Correct taxable amount (1 mark)
Incorrect final answer**Exemplar 3**

(2 marks)

$$\$287.50$$

Mark: 1 out of 2**Rationale:** Correct final answer (no process shown) (1 mark)

Question 3

E6.H.1

1 mark

Describe one regular home maintenance task that could prevent an expensive emergency repair cost.

Sample Answers:

- Trimming overhanging tree branches to prevent roof damage.
- Getting your sewer pipes cleared of tree roots to prevent sewer backup.
- Checking the furnace annually and regularly replacing the filter.

Exemplar 1

(1 mark)

fit it before it breaks

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

(1 mark)

a cracked window - replace it before the crack gets bigger or it makes your heating bill go up

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

(1 mark)

- Repairing broken shingles when they are loose/cracked

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

Question 4

E6.H.1

1 mark

Choose the letter that best completes the statement below.

One benefit of owning a house instead of renting an identical house is that:

- A) the initial costs are lower
- B) the property is an investment
- C) the insurance cost is lower
- D) you are not responsible for repair and maintenance costs

Answer: B)



Question 5

E6.H.1

3 marks

The Leon family purchased a new energy efficient washing machine. It uses 125 L less water per load than their old machine.

- A) The Leon family does 12 loads of laundry per week with their new machine.

Calculate how many litres of water they will save per year. (1 mark)

Answer:

$$\begin{aligned} &12 \times 52 \times 125 \text{ L} \\ &= 78\,000 \text{ L} \end{aligned} \quad \leftarrow 1 \text{ mark}$$

- B) Calculate how much money the Leon family will save per year with their new washing machine if they pay \$2.85 per 1000 L of water. (1 mark)

Answer:

$$\begin{aligned} &\frac{78\,000 \text{ L} \times \$2.85}{1000 \text{ L}} \\ &= \$222.30 \end{aligned} \quad \leftarrow 1 \text{ mark}$$

- C) The Leon family paid \$889.20 for their new washing machine.

Calculate how many years it will take for the amount of money saved to equal the value of the new washing machine. (1 mark)

Answer:

$$\begin{aligned} &\frac{\$889.20}{\$222.30} \\ &= 4 \text{ years} \end{aligned} \quad \leftarrow 1 \text{ mark}$$

Exemplar 1

(3 marks)

A) $136,875\text{ L}$

B) $\$390.09$

C) $390.09 \times 2.5 = 975.23$

it will take 2 and a half years

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

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

Incorrect answer in Part C

Exemplar 2

(3 marks)

A) $12 \times 125\text{ L} = 1500\text{ L}$

B) $1500 \times 4 \times 12 = 72000 \div 1000 = 72 \times 2.85 = 205.20$

They will save $\$205.20$

C) $889.20 \div 205.20 = 4.3$
right about 4.3 years

Mark: 2 out of 3**Rationale:** Incorrect answer in Part A

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

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

Question 6

E6.H.1

1 mark

Choose the letter that best completes the statement below.

Two ongoing expenses of owning a home are:

- A) heating costs and home insurance
- B) heating costs and property tax adjustment
- C) home insurance and land transfer tax
- D) property tax and land transfer tax

Answer: _____ A)



Question 7

E6.H.1

4 marks

Adele is buying a house for \$275 000. She makes a \$55 000 down payment. She obtains a mortgage for the remaining amount. The amortization rate is \$6.44 per thousand dollars borrowed (based on an interest rate of 4.75% for 20 years).

A) Calculate the monthly mortgage payment. (2 marks)

Answer:

$$\begin{array}{l} \text{Mortgage amount: } \$275\,000 - \$55\,000 \\ \qquad \qquad \qquad = \$220\,000 \end{array} \left. \vphantom{\begin{array}{l} \text{Mortgage amount: } \$275\,000 - \$55\,000 \\ \qquad \qquad \qquad = \$220\,000 \end{array}} \right\} \leftarrow 1 \text{ mark for process}$$

$$\begin{array}{l} \text{Monthly payment: } \$220\,000 \times \frac{\$6.44}{\$1000} \\ \qquad \qquad \qquad = \$1416.80 \end{array} \quad \leftarrow 1 \text{ mark}$$

B) Calculate the total amount paid for the house after the 20 years, including the down payment. (2 marks)

Answer:

$$\begin{array}{l} \text{Total payments: } \$1416.80 \times 12 \times 20 \\ \qquad \qquad \qquad = \$340\,032 \end{array} \quad \leftarrow 1 \text{ mark}$$

$$\begin{array}{l} \text{Total paid for house: } \$340\,032 + \$55\,000 \\ \qquad \qquad \qquad = \$395\,032 \end{array} \quad \leftarrow 1 \text{ mark}$$

OR**Answer:**

$$\begin{array}{l} \text{Total paid for house: } (\$1416.80 \times 240) + \$55\,000 \\ \qquad \qquad \qquad = \$395\,032 \end{array} \quad \begin{array}{l} \leftarrow 1 \text{ mark} \\ \leftarrow 1 \text{ mark} \end{array}$$

Exemplar 1

(4 marks)

A)

$$\begin{aligned}
 & 275000 - 220000 \leftarrow \begin{matrix} 55000 \\ \text{price of house after} \\ \text{Down payment} \end{matrix} \\
 & 220000 (0.0475)(20) \\
 & = \$209000 / 20 = 10450 / 12 \\
 & = 870.83 \\
 & \text{Monthly Mortgage} = \$870.83
 \end{aligned}$$

B)

$$\begin{aligned}
 & \cancel{275000} + 55000 + 209000 \\
 & \frac{220000}{1000} \cdot 6.44 = 1416.8 \\
 & 220000 + 55000 + 209000 + 1416 = 485416 \\
 & \$485416.00 \text{ is the total amount} \\
 & \text{paid in 20 years}
 \end{aligned}$$

Mark: 1 out of 4**Rationale:** Correct mortgage amount in Part A (1 mark)

Incorrect monthly payment in Part A

Incorrect answer in Part B

Exemplar 2

(4 marks)

A)

$$275,000 \times 0.0475 \times 1 = 13062.50 \div 12 = 1088.54$$

B)

$$\begin{array}{r}
 \times 1088.54 \\
 12 \\
 \hline
 13062.50 \\
 \times 20 \\
 \hline
 55000 + 261250 \\
 \hline
 \$316,250
 \end{array}$$

E6

Mark: 2 out of 4**Rationale:** Incorrect answer in Part A

Correct answer in Part B (follow-through error) (2 marks)

E6 (rounds incorrectly)

Exemplar 3

(4 marks)

A) $275,000 \times \frac{6.44}{1000} = \1771

B) $1771 \times 12 \times 20 = 425040 + 55,000 = 480,040$ E5

Mark: 3 out of 4**Rationale:** Incorrect mortgage amount in Part A

Correct monthly payment in Part A (follow-through error) (1 mark)

Correct answer in Part B (follow-through error) (2 marks)

E5 (does not include units in final answer)



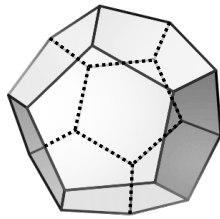
Probability

Question 8

E6.P.1

1 mark

Taryn rolls a fair dodecahedron (12-sided die). Its sides are numbered 1 through 12.



State the probability, as a decimal, of rolling a number less than 6.

Answer:

$$\frac{5}{12}$$

= 0.42 ← 1 mark

Exemplar 1

(1 mark)

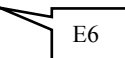
$$\frac{5}{12}$$


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

E2 (answer expressed in an alternative form than requested)

Exemplar 2

(1 mark)

$$\frac{5}{12} = 0.416$$


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

E6 (rounds incorrectly)

Question 9

E6.P.1

2 marks

At a hockey game, one person is randomly selected to win a prize. There are 1000 people in attendance. Of those in attendance, 175 are children.

- A) Calculate the probability, as a percent, of a child winning the prize. (1 mark)

Answer:

$$\begin{aligned} & \frac{175}{1000} \times 100 \\ & = 17.5\% \quad \leftarrow 1 \text{ mark} \end{aligned}$$

- B) State the odds **against** a child winning the prize. (1 mark)

Answer:

825 : 175 or 33 : 7

Note to marker: Accept equivalent ratios.

Exemplar 1

(2 marks)

A) $P = \frac{\text{\# of ways an event can occur}}{\text{Total \# of possible outcomes}}$

$$P = \frac{175}{825}$$

$$P = 0.21$$

$$P = 21\% \text{ are children}$$

B) $\text{Odds against} = \frac{\text{What you don't want}}{\text{What you want}}$

$$O.A. = \frac{825}{175}$$

$$O.A. = 4.7 \text{ or } 5$$

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

Incorrect odds in Part B

Exemplar 2

(2 marks)

A) $\frac{175}{1000} = .175\%$

B) $825:175$

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

Correct odds in Part B (1 mark)

Exemplar 3

(2 marks)

A) $1000 - 175 = 825$ adult and 175 children.

$$\frac{175}{1000} = 0.175 \text{ or } \boxed{17.5\%}$$

B)
$$\frac{825}{175} \quad 825 \div 175$$

Mark: 1 out of 2

Rationale: Correct probability in Part A (1 mark)

Incorrect odds in Part B



Question 10

E6.P.1

3 marks

A graduation committee wants to fundraise by raffling off a \$400 hot-air balloon ride. There are 500 tickets being sold for \$5 each.

Calculate the expected value if you buy 7 tickets. (3 marks)

Answer:

$$\text{\$gain: } \$400 - \$5(7) = \$365$$

$$\text{\$loss: } \$5(7) = \$35$$

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

$$= \underbrace{\left(\frac{7}{500}\right)(\$365)}_{1 \text{ mark}} - \underbrace{\left(\frac{493}{500}\right)(\$35)}_{1 \text{ mark}}$$

$$= \$5.11 - \$34.51$$

$$= -\$29.40$$

← 1 mark

OR

Answer:

$$\text{Average earning for one ticket: } \left(\frac{1}{500}\right)(\$400) - \$5 \quad \leftarrow 1 \text{ mark for process}$$

$$= -\$4.20$$

← 1 mark

$$EV = (-\$4.20)(7)$$

$$= -\$29.40$$

← 1 mark

OR

Answer:

$$\text{Average earning: } \left(\frac{7}{500}\right)(\$400) \quad \leftarrow 1 \text{ mark for process}$$

$$= \$5.60$$

← 1 mark

$$EV = \$5.60 - \$35$$

$$= -\$29.40$$

← 1 mark

Note to marker: Award one mark for a follow-through error only if two correct values have been used in the process.

Exemplar 1

(3 marks)

$$5 \times 7 = 35$$

Win	400	365 ⁻³⁵
lose	0	-35
		= -35

$$365$$

$$+ (-35)$$

$$= 330$$

E5

Mark: 1 out of 3**Rationale:** Incorrect $P(\text{win}) \times \$\text{gain}$ Incorrect $P(\text{lose}) \times \$\text{loss}$

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

E5 (does not include units in final answer)

Exemplar 2

(3 marks)

$$\frac{7}{500} = 0.014$$

$$5 \times 7 = 35$$

$$400 - 35 = 365$$

$$0.014 \times 365 = 5.11$$

$$\frac{500}{7} = 71.43$$

$$71.43 \times (-35) = -2,500.05$$

$$5.11$$

$$(-2,500.05)$$

$$\$ -2,494.94$$

Mark: 2 out of 3**Rationale:** Correct $P(\text{win}) \times \$\text{gain}$ (1 mark)Incorrect $P(\text{lose}) \times \$\text{loss}$

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

Exemplar 3

(3 marks)

$$\text{Gain } P = \frac{7}{500} = 0.014 \quad 400 - 5 = \$395 \times 0.014 = 5.53$$

$$\text{Loss } P = \frac{493}{500} = 0.986 \quad 0 - 5 = \$ -5 \times 0.986 = -4.93$$

$$5.53 - 4.93 = 0.6$$

E5

Mark: 2 out of 3**Rationale:** Incorrect $P(\text{win}) \times \$\text{gain}$ Correct $P(\text{lose}) \times \$\text{loss}$ (follow-through error) (1 mark)

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

E5 (does not include units in final answer)



Question 11

E6.P.1

1 mark

The odds in favour of being struck by lightning this year are 1 : 960 000 .

State the probability, as a fraction, of being struck by lightning this year.

Answer:

$$\frac{1}{960\,001}$$

Exemplar 1

(1 mark)

$$\frac{1}{100,001} \approx 0.000001 \approx 0.001\%$$

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

Question 12

E6.P.1

2 marks

Connor is a goalie. The opposing team took 32 shots on him. He saved 93.75% of these shots.

Calculate how many shots Connor did **not** save. (2 marks)

Answer:

Shots saved: 0.9375×32

= 30 shots saved ← 1 mark

Shots not saved: $32 - 30$

= 2 shots not saved ← 1 mark

OR

Answer:

$1 - 0.9375 = 0.0625$

0.0625×32 ← 1 mark

= 2 shots not saved ← 1 mark

Exemplar 1

(2 marks)

2

Mark: 1 out of 2**Rationale:** Correct final answer (no process shown) (1 mark)**Exemplar 2**

(2 marks)

$$93.75 \div 100 = 0.9375$$

$$32 \times 0.9375 = 30$$

he stole 30 shots

Mark: 1 out of 2**Rationale:** Correct number of shots saved (1 mark)

Question 13

E6.P.1

2 marks

Five cards numbered 1 to 5 are placed in a bag.

David randomly picks one card from the bag. He records the number and then puts the card back in the bag. He does this a total of 10 times.

Here are the results:



A) State the experimental probability of David picking a 4. (1 mark)

Answer:

$\frac{3}{10}$ or 0.3 or 30% or 3 : 10 or three out of ten

Note to marker: Accept equivalent representations.

B) David thinks the theoretical probability of picking a 5 is 50%.

Explain why David is incorrect. (1 mark)

Sample Answers:

- The theoretical probability is 20%.
- He used experimental probability.

Exemplar 1

(2 marks)

- A) 30 %, there are 10 cards
and 3 are 4s
(3/10 or 30%)
- B) He is correct because there
are 10 cards and 5 are a 5 so
it is 5/10 or 1/2 or 50%

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

Incorrect answer in Part B

Exemplar 2

(2 marks)

A) $\frac{3}{10}$

- B) because all the cards
have an equal chance of
being picked

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

Correct answer in Part B (1 mark)

Vehicle Finance

Question 14 E5.V.1

2 marks

A new truck is worth \$30 000. The truck's value depreciates at a rate of 25% per year.

Calculate the value of the truck at the end of the first year. (2 marks)

Answer:

$$\begin{array}{ll} \text{Depreciation amount: } \$30\,000 \times 0.25 & \\ = \$7500 & \leftarrow 1 \text{ mark} \end{array}$$

$$\begin{array}{ll} \text{Value of the truck: } \$30\,000 - \$7500 & \\ = \$22\,500 & \leftarrow 1 \text{ mark} \end{array}$$

OR

Answer:

$$\begin{array}{ll} \text{Value of the truck: } \$30\,000 \times 0.75 & \leftarrow 1 \text{ mark} \\ = \$22\,500 & \leftarrow 1 \text{ mark} \end{array}$$

Exemplar 1

(2 marks)

$$25\% \div 100 = 0.25$$

$$\$30\,000 \times 0.25 = \$7500$$

Mark: 1 out of 2**Rationale:** Correct depreciation amount (1 mark)**Exemplar 2**

(2 marks)

E5

22500

Mark: 1 out of 2**Rationale:** Correct truck value (no process shown) (1 mark)
E5 (does not include units in final answer)

Question 15

E5.V.1

1 mark

Choose the letter that best completes the statement below.

In Manitoba, the cost of car insurance is **not** affected by the:

- A) age of the driver
- B) amount of the deductible
- C) driving record
- D) location the car is driven

Answer: A)



Question 16

E5.V.1

1 mark

A car's trip meter shows that it has travelled 636 km. The car used 60 L of fuel for this trip.

Calculate the fuel economy in L/100 km.

Answer:

$$\begin{aligned} FE &= \frac{\text{L}}{\text{km}} \times 100 \\ &= \frac{60}{636} \times 100 \\ &= 9.43 \text{ L/100 km} \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Note to marker: Accept 0.0943 L/km with an E2 error (answer expressed in an alternative form than requested). Units must be correct.

OR

Answer:

$$\begin{aligned} \frac{60}{636} &= \frac{x}{100} \\ 636x &= 6000 \\ x &= 9.43 \text{ L/100 km} \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Note to marker: Accept 0.0943 L/km with an E2 error (answer expressed in an alternative form than requested). Units must be correct.

Exemplar 1

(1 mark)

$$(L/100km) \times km$$
$$(60/100) \times 636 = 381.6$$

The fuel economy is 381.6

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

(1 mark)

$$F.E. = \left(\frac{\text{fuel used in L}}{\text{Distance in km}} \right) \times 100$$
$$F.E. = \left(\frac{60}{636} \right) \times 100$$
$$F.E. = 9.433962264$$
$$F.E. = 9.4L/km$$

E5

E6

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

E5 (uses incorrect units of measure)

E6 (does not express the answer to the appropriate number of decimal places)

Exemplar 3

(1 mark)

$$\frac{60}{636} \times 100 = 9.4L$$

The car used 9.4L/100km

E6

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

E6 (does not express the answer to the appropriate number of decimal places)

Question 17

E5.V.1

1 mark

Choose the letter that best completes the statement below.

Alia will either finance the purchase of a vehicle or lease the vehicle long term.

She decides to lease because:

- A) the insurance is less expensive
- B) there is no cost for additional kilometers
- C) the leased vehicle can be used as equity for additional financing
- D) the monthly payments are lower

Answer: D)



Question 18

E5.V.1

3 marks

Da-eun takes her motorcycle to the repair shop to have the oil changed and suspension repaired. The repair shop charges \$125 per hour for labour. The service details are shown in the table below:

Service	Cost of Parts/Supplies	Hours of Labour Required
Oil change	\$18	0.5
Suspension repair	\$227	1.75

Calculate the total amount Da-eun will pay, after taxes. (3 marks)

Answer:

Total cost of parts/supplies: \$245

Total labour cost: $2.25 \text{ hrs} \times \$125/\text{hr}$
 $= \$281.25$ } ← 1 mark for process or correct total labour cost

Subtotal: $\$245 + \281.25
 $= \$526.25$ } ← 1 mark for process or correct subtotal

Total amount: $\$526.25 \times 1.13$
 $= \$594.66$ ← 1 mark

OR**Answer:**

Subtotal: $\underbrace{[\$18 + (\$125/\text{hr})(0.5 \text{ hr})]}_{\substack{\text{1 mark for} \\ \text{oil change} \\ \text{parts and labour}}} + \underbrace{[\$227 + (\$125/\text{hr})(1.75 \text{ hrs})]}_{\substack{\text{1 mark for} \\ \text{suspension} \\ \text{parts and labour}}}$

Total amount: $(\$80.50 + \$445.75) \times 1.13$
 $= \$594.66$ ← 1 mark

Exemplar 1

(3 marks)

$$\begin{array}{r} 18 \\ + 227 \\ + 125(0.5) \\ + 175 \\ \hline \$492.5 \end{array}$$

Mark: 1 out of 3

Rationale: Correct oil change parts and labour (1 mark)
Incorrect suspension parts and labour
Incorrect total amount

Exemplar 2

(3 marks)

$$\begin{array}{l} \text{oil change} = 18 + 62.5 = \$80.5 \\ \text{suspension repair } 227 + 218.75 \quad \begin{array}{r} 80.50 \\ + 218.75 \\ \hline \$299.25 \end{array} \\ 1.75 \times 125 = 218.75 \\ \text{Total} \\ 299.25 \times 0.13 = \$389.02 \end{array}$$

Mark: 1 out of 3

Rationale: Correct oil change parts and labour (1 mark)
Incorrect suspension parts and labour
Incorrect total amount

Exemplar 3

(3 marks)

$$245 + 229 = 470 \times 1.13 = \$531.1$$

E6

Mark: 2 out of 3

Rationale: Incorrect labour cost
Correct subtotal (follow-through error) (1 mark)
Correct total amount (follow-through error) (1 mark)
E6 (does not express the answer to the appropriate number of decimal places)

Question 19 E5.V.1

3 marks

Valentina wants to buy a used vehicle through a private sale. The vehicle is priced at \$23 200 and has a book value of \$21 900.

A) Calculate the total amount Valentina will pay for her vehicle, after taxes. (2 marks)

Answer:

$$\begin{aligned}\text{Total amount: } & \underbrace{\$23\,200 \times 1.08}_{1 \text{ mark}} \\ & = \$25\,056 \quad \leftarrow 1 \text{ mark}\end{aligned}$$

B) Valentina will need to get a safety inspection for \$55.

Calculate the cost of the safety inspection, after taxes. (1 mark)

Answer:

$$\begin{aligned}\text{Cost of safety: } & \$55 \times 1.05 \\ & = \$57.75 \quad \leftarrow 1 \text{ mark}\end{aligned}$$

Exemplar 1

(3 marks)

A) $23200 \times 1.05 = 24360$

B) $55 \times 1.05 = 57.75 \times 1.13 = 62.25$

Mark: 1 out of 3

Rationale: Correct vehicle price in Part A (1 mark)
Incorrect total amount in Part A
Incorrect answer in Part B

Exemplar 2

(3 marks)

A) \$23200

B) \$55

Mark: 1 out of 3

Rationale: Correct vehicle price in Part A (1 mark)
Incorrect total amount in Part A
Incorrect answer in Part B

Exemplar 3

(3 marks)

A) $21900 \times 1.08 = 23652$ E5

B) $55 \times 1.05 = 57$ E5 E6

Mark: 2 out of 3

Rationale: Incorrect vehicle price in Part A
Correct total amount in Part A (follow-through error) (1 mark)
E5 (does not include units in final answer)
Correct answer in Part B (1 mark)
E5 (does not include units in final answer)
E6 (does not express the answer to the appropriate number of decimal places)

Question 20

E5.V.1

3 marks

Gwen wants to borrow \$23 000 to purchase a car. A bank offers her an interest rate of 5.25% over 5 years.

- A) Calculate the amount of interest Gwen would pay on her first month's payment. (2 marks)

Answer:

$$I = Prt$$

$$= (\$23\,000)(0.0525)\left(\frac{1}{12}\right) \quad \leftarrow 1 \text{ mark for all correct substitutions}$$

$$= \$100.63 \quad \leftarrow 1 \text{ mark}$$

Note to marker: Award one mark for a follow-through error only if two of three correct substitutions are made and if all three variables (Prt) are represented.

- B) Explain how Gwen can reduce the total interest paid over the life of this loan if she is unable to make a larger down payment. (1 mark)

Sample Answers:

- get a shorter amortization period
- get a lower interest rate
- make additional payments

Exemplar 1

(3 marks)

A) $23000 \times 5.25\% \times 5 = 6037.50$

$6037.50 \div 12 = 503.12$

E5

E6

B) Make a deposit.

Mark: 1 out of 3

Rationale: Incorrect substitutions in Part A

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

E5 (does not include units in final answer)

E6 (rounds incorrectly)

Incorrect response in Part B

Exemplar 2

(3 marks)

A) $\frac{23000 \times 0.0525}{5} = \241.5

E6

B) She can make more money, get a smaller loan.

Mark: 1 out of 3

Rationale: Incorrect substitutions in Part A

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

E6 (does not express the answer to the appropriate number of decimal places)

Incorrect response in Part B

Exemplar 3

(3 marks)

A) $23,000 \times 0.0525$
 ≈ 1207.50 ← First year
 $\frac{1207.50}{12}$
 ≈ 100.63

B) Take the loan for less than 5 years.

Mark: 3 out of 3

Rationale: Correct substitutions in Part A (1 mark)

Correct final answer in Part A (1 mark)

Correct response in Part B (1 mark)



Question 21

E5.V.1

2 marks

Darvin is buying a new BMW in Manitoba. The base price is \$36 500 and he adds a performance package worth \$3500. The freight is \$650 and the dealership gives him \$13 000 as a trade-in value on his old vehicle.

Calculate the total cost of the new vehicle, after taxes. (2 marks)

Answer:

$$\begin{aligned}\text{Total cost, before taxes: } & \$36\,500 + \$3\,500 + \$650 - \$13\,000 \\ & = \$27\,650 \qquad \qquad \qquad \leftarrow 1 \text{ mark}\end{aligned}$$

$$\begin{aligned}\text{Total cost: } & \$27\,650 \times 1.13 \\ & = \$31\,244.50 \qquad \qquad \qquad \leftarrow 1 \text{ mark}\end{aligned}$$

Exemplar 1

(2 marks)

$$\begin{array}{r} 36500 \\ 3500 \\ \hline 40650 \\ -13000 \\ \hline 27650 \end{array}$$

Mark: 1 out of 2

Rationale: Correct cost before taxes (1 mark)
Incorrect total cost

Exemplar 2

(2 marks)

$$\begin{aligned} &36\,500 + 3500 \\ &40\,000 \times 1.13 \\ &= 45\,200 + 650 \\ &= 45\,850 - 13\,000 \\ &\boxed{= \$32\,850} \end{aligned}$$

Mark: 1 out of 2

Rationale: Incorrect application of tax
Correct total cost (follow-through error) (1 mark)

Exemplar 3

(2 marks)

$$36500 + 3500 = 40000 + 650 = 40650$$

$$40650 - 13000 = 27650 + \text{tax owed}$$

$$27650 \times 0.07 \underset{\text{Pst}}{=} \$1935.50$$

$$+ \\ 27650 \times 0.05 \underset{\text{GST}}{=} \underline{\$1382.50} \\ \$3318$$

$$27650 + 3318 = \$30968$$

$$\text{Total cost} = \$30968$$

Mark: 1 out of 2**Rationale:** Correct cost before taxes (1 mark)
Incorrect total cost



Question 22

E5.V.1

1 mark

Obed is leasing a truck worth \$39 000, before taxes. He decides to purchase the truck at the end of his 3-year lease. The truck has a residual value of 60%.

Calculate how much Obed must pay to purchase the truck at the end of his lease, before taxes.

Answer:

Residual value: $\$39\,000 \times 0.60$

$= \$23\,400$

← 1 mark

Exemplar 1

(1 mark)

$$39,000 \times 0.60 = 23,400$$

$$39,000 - 23,400 = 15,600$$

object must pay 15,600 to purchase the truck.

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

(1 mark)

E1

$$23400 \times 1.13 = \$26442$$

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

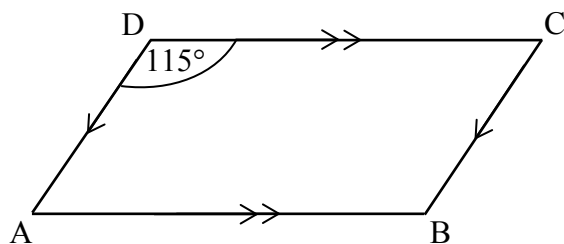
E1 (too much information is presented in the answer and the information is numerically and conceptually correct)

Geometry and Trigonometry

Question 23 E6.G.2

1 mark

The following shape is a parallelogram.



State the measure of $\angle A$.

Answer:

$$\begin{aligned}\angle A &= \frac{(360^\circ - 115^\circ - 115^\circ)}{2} \\ &= 65^\circ \quad \leftarrow 1 \text{ mark}\end{aligned}$$

OR

Answer:

$$\begin{aligned}\angle A &= 180^\circ - 115^\circ \\ &= 65^\circ \quad \leftarrow 1 \text{ mark}\end{aligned}$$

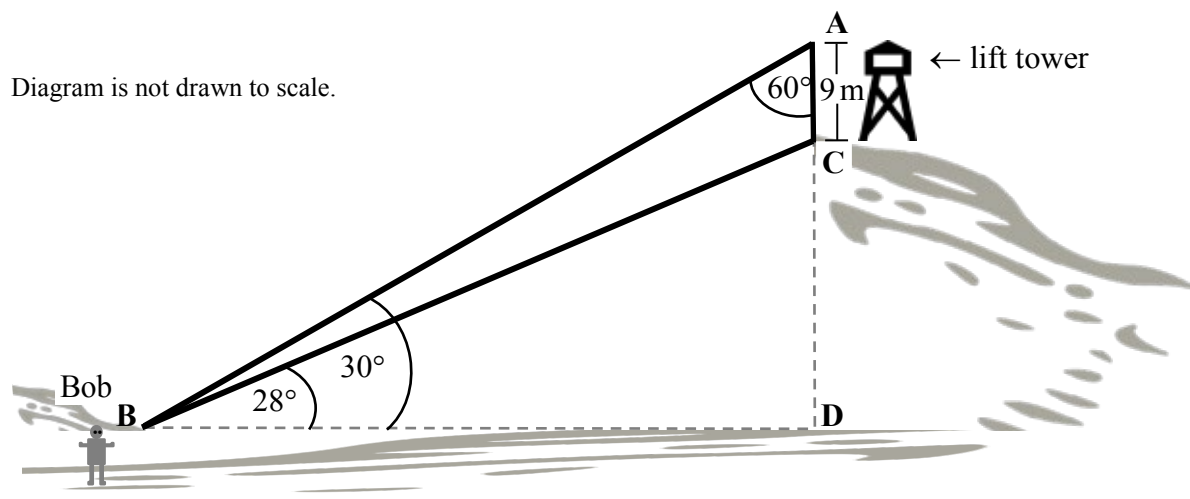


Question 24 E6.G.1, E6.G.2

4 marks

Bob is standing at the base of a mountain. The angle of elevation to the bottom of the lift tower is 28° . The angle of elevation to the top of the lift tower is 30° . The lift tower is 9 m tall.

Diagram is not drawn to scale.



- A) State the measure of $\angle ABC$. (1 mark)

Answer:

$$\begin{aligned}\angle ABC &= 30^\circ - 28^\circ \\ &= 2^\circ \quad \leftarrow 1 \text{ mark}\end{aligned}$$

- B) Calculate the distance from Bob to the bottom of the lift tower ($\overline{BC}$). (3 marks)

Answer:

$$\begin{aligned}\frac{\sin A}{a} &= \frac{\sin B}{b} && \leftarrow 1 \text{ mark for identification of sine law} \\ \frac{\sin 2^\circ}{9} &= \frac{\sin 60^\circ}{\overline{BC}} \\ \overline{BC} &= \frac{9(\sin 60^\circ)}{\sin 2^\circ} && \leftarrow 1 \text{ mark for process/substitution} \\ \overline{BC} &= 223.33 \text{ m} && \leftarrow 1 \text{ mark}\end{aligned}$$

Exemplar 1

(4 marks)

A) 28

B)
$$\sin \frac{28}{6} = \sin \frac{60}{9}$$

$$(28 \times 9) \div 60 = 4.2 \text{ m}$$

Mark: 1 out of 4**Rationale:** Incorrect answer in Part A

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

Incorrect process in Part B

Incorrect final answer in Part B

Exemplar 2

(4 marks)

A) 30°

B)
$$\frac{\sin 30^\circ}{9} \times \frac{\sin 60^\circ}{d}$$

$$\frac{\cancel{\sin 30^\circ} \times d}{\cancel{\sin 30^\circ}} = \frac{\sin 60^\circ \times 9}{\sin 30^\circ}$$

$$d = \sin 30 \times 9$$

$$d = 7.7 \text{ m}$$

Mark: 2 out of 4**Rationale:** Incorrect answer in Part A

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

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

Incorrect final answer in Part B

Exemplar 3

(4 marks)

A)

$$\angle D = 40^\circ$$
$$\angle C = 62^\circ$$

$$180 - 118 - 60 = 2^\circ$$

B)

$$\sin 60 \cdot \frac{9}{\sin 2} = \frac{\overline{BC}}{\sin 60} \cdot \sin 60$$

$$\frac{\sin 60 \cdot 9}{\sin 2} = \overline{BC}$$

$$3.01m = \overline{BC}$$

Mark: 3 out of 4**Rationale:** Correct answer in Part A (1 mark)

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

Correct process in Part B (1 mark)

Incorrect final answer in Part B

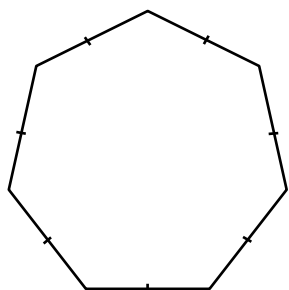


Question 25

E6.G.2

2 marks

Given the following regular heptagon:



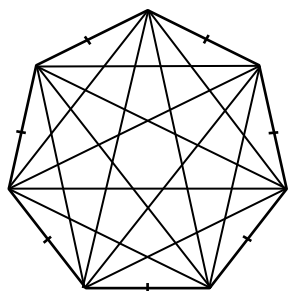
Calculate or illustrate the total number of diagonals that can be drawn.
If illustrating, clearly state the total number of diagonals. (2 marks)

Answer:

$$\begin{aligned} D &= \frac{n(n-3)}{2} \\ &= \frac{7(7-3)}{2} && \leftarrow 1 \text{ mark for process/substitution} \\ &= \frac{28}{2} \\ &= 14 \text{ diagonals} && \leftarrow 1 \text{ mark} \end{aligned}$$

OR

Answer:



$\leftarrow 1$ mark for process

= 14 diagonals

$\leftarrow 1$ mark

Exemplar 1

(2 marks)

$$D = \frac{n(n-3)}{2}$$
$$= 11$$

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

(2 marks)

$$\frac{8(8-3)}{2} = 20 \text{ diagonals}$$

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

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

Exemplar 3

(2 marks)

$$D = \frac{n(n-3)}{2}$$
$$= \frac{7(7+3)}{2}$$
$$= 35$$

E3

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

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

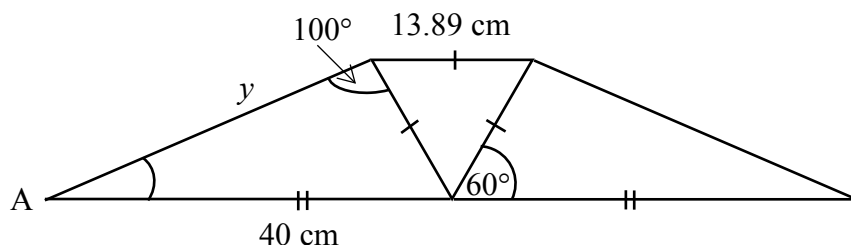
E3 (makes a transcription error)

Question 26

E6.G.1, E6.G.2

2 marks

Leslie is designing a new quilt whose pattern consists of one equilateral triangle and two congruent obtuse triangles.



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

Answer:

$$\begin{aligned}\angle A &= 180^\circ - (100^\circ + 60^\circ) \\ &= 20^\circ\end{aligned}\quad \leftarrow 1 \text{ mark}$$

- B) Choose the equation that allows you to solve for y . (1 mark)

A) $y^2 = 13.89^2 + 40^2 - 2(13.89)(40)\cos 60^\circ$

B) $y^2 = 40^2 + 13.89^2 - 2(40)(13.89)\cos 100^\circ$

C) $\frac{\sin 13.89}{y} = \frac{\sin 100^\circ}{40}$

D) $\frac{\sin 40}{100} = \frac{\sin y}{13.89}$

Answer: A)



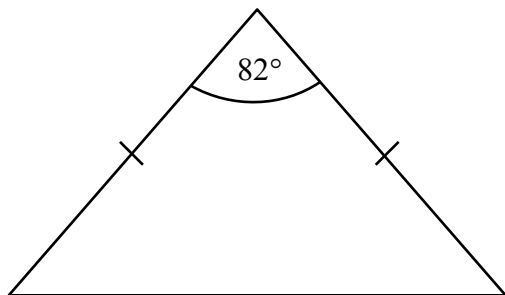
Question 27

E6.G.2

1 mark

The angle at the top of the following isosceles triangle is 82° .

Calculate the measure of one of the base angles.

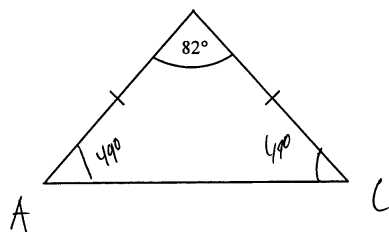
**Answer:**

$$\begin{aligned}\text{Base angle} &= \frac{(180^\circ - 82^\circ)}{2} \\ &= 49^\circ\end{aligned}$$

 $\leftarrow$ 1 mark

Exemplar 1

(1 mark)

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

(1 mark)

$$180 - 82 = 98$$
$$98 / 2 = 49$$

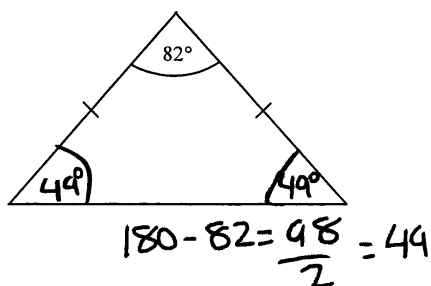
E5

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

E5 (does not include units in final answer)

Exemplar 3

(1 mark)

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

Question 28

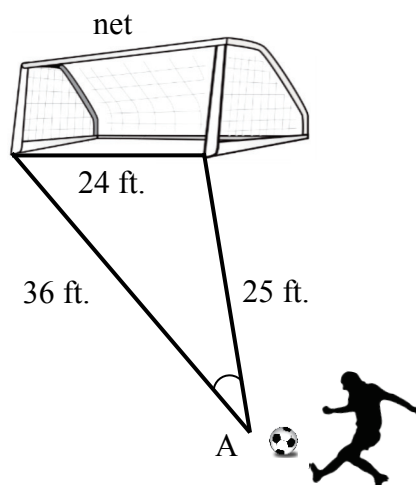
E6.G.1

3 marks

The posts of a soccer net are 24 ft. apart. A player attempts to score a goal by kicking the ball from a point 25 ft. from one post and 36 ft. from the other.

Calculate the measure of angle A. (3 marks)

Diagram is not drawn to scale.



Answer:

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

← 1 mark for identification of cosine law

$$\cos A = \frac{25^2 + 36^2 - 24^2}{2(25)(36)}$$

$$\cos A = \frac{625 + 1296 - 576}{1800}$$

$$\cos A = \frac{1345}{1800}$$

$$\cos A = 0.747\bar{2}$$

$$\angle A = 41.65^\circ$$

← 1 mark for process/substitution

← 1 mark

Exemplar 1

(3 marks)

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos A = \frac{35^2 + 296 - 576}{2 \times 25 \times 36} = \frac{1345}{1800} = 0.7472222222$$

Mark: 2 out of 3**Rationale:** Correct identification of cosine law (1 mark)

Correct process/substitution (1 mark)

Incorrect answer

Exemplar 2

(3 marks)

$$\cos A = \frac{25^2 + 36^2 - 24^2}{(2 \times 25 \times 36)} = \sin^{-1} 0.7472222222 = 48^\circ$$

Mark: 2 out of 3**Rationale:** Correct identification of cosine law (1 mark)

Correct process/substitution (1 mark)

Incorrect answer

Exemplar 3

(3 marks)

$$\cos A = \frac{25^2 + 36^2 - 24^2}{2(25)(36)} = \frac{1345}{1800}$$

$\cos^{-1}$
 $\cos A = 0.747$ E5

$A = 41.66$ E6

Mark: 3 out of 3**Rationale:** Correct identification of cosine law (1 mark)

Correct process/substitution (1 mark)

Correct answer (1 mark)

E5 (does not include units in final answer)

E6 (rounds incorrectly)

Question 29

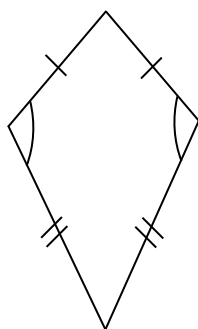
E6.G.2

2 marks

A kite is a type of quadrilateral.

Sketch a kite and identify all congruent interior angles and sides. (2 marks)

Answer:



← 1 mark for labelling both pairs of congruent sides

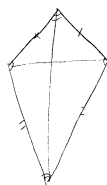
← 1 mark for labelling the pair of congruent angles

Exemplar 1

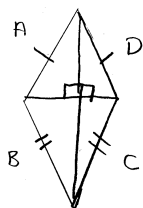
(2 marks)

**Mark: 0 out of 2****Rationale:** Incorrect sides
Incorrect angles**Exemplar 2**

(2 marks)

**Mark: 1 out of 2****Rationale:** Correct sides (1 mark)
Incorrect angles**Exemplar 3**

(2 marks)



Side A = Side D
Side B = Side C

Mark: 1 out of 2**Rationale:** Correct sides (1 mark)
Incorrect angles

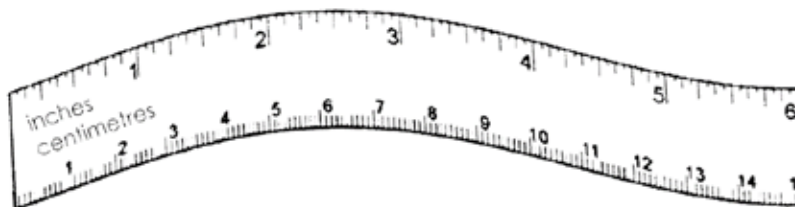
Precision Measurement

Question 30

E5.P.1

1 mark

Paul continually bends and unbends his flexible plastic ruler. It now looks like this:



Choose the letter that best completes the statement below.

The aspect of measurement that is affected is:

- A) precision
- B) uncertainty
- C) tolerance
- D) accuracy

Answer: D)

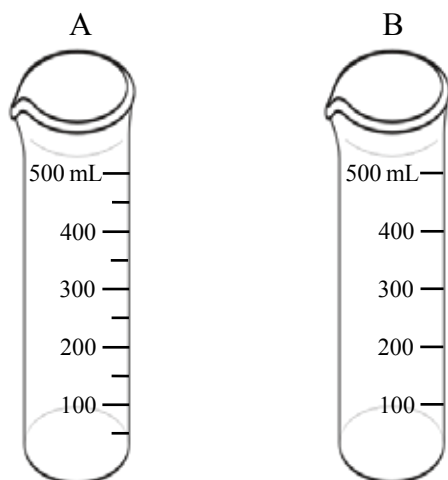


Question 31

E5.P.1

2 marks

Rick is measuring the volume of a liquid using the cylinders below:



A) State the precision of cylinder A. (1 mark)

Answer:

50 mL

Note to marker: Do not accept a range for precision (e.g., ± 50 mL).

B) Justify which cylinder is more precise. (1 mark)

Sample Answers:

- Cylinder A is more precise because it has smaller increments.
- Cylinder A is more precise because it has 50 mL increments. Cylinder B has 100 mL increments.

Exemplar 1

(2 marks)

A) $\pm 50 \text{ mL}$

B) cylinder A because it goes up by 50

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

Insufficient response in Part B

Exemplar 2

(2 marks)

A) $50 \text{ mL} \pm 25$ B) a, cause you can see the ticks
if you need to be at 50 mLs**Mark: 1 out of 2****Rationale:** Incorrect answer in Part A

Correct response in Part B (1 mark)

Exemplar 3

(2 marks)

A) $\pm 25 \text{ mL}$

B) cylinder A

It has ticks in between
the hundred ticks.**Mark: 1 out of 2****Rationale:** Incorrect answer in Part A

Correct response in Part B (1 mark)

Question 32

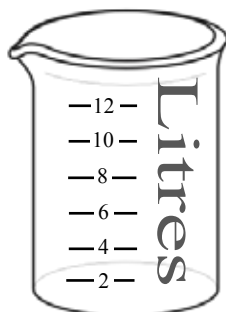
E5.P.1

3 marks

Marco needs to mix water with his eco-friendly herbicide concentrate for his garden. If too little water is added to the herbicide, it will kill his vegetables. However, if too much water is added, the herbicide will not be effective.

- A) State the uncertainty of the measurement if Marco uses Container A. (1 mark)

Container A



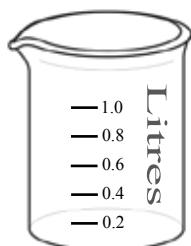
Answer:

± 1 L

Note to marker: $\pm$ not required

- B) Marco needs to add 12 L of water to the herbicide using Container B.

Container B



Calculate the total uncertainty of the measurements if Marco uses the container 12 times.
(2 marks)

Answer:

Uncertainty: ± 0.1 L

Total uncertainty: 0.1×12

$= \pm 1.2$ L

← 1 mark for process

← 1 mark

Note to marker: $\pm$ not required

Exemplar 1

(3 marks)

A) $\frac{2}{2} = 1$ E5

B) $\frac{1.0}{2} = .5$

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

E5 (does not include units in final answer)

Incorrect answer in Part B

Exemplar 2

(3 marks)

A) 1 L

B) .1 L

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

Correct process in Part B (uncertainty of Container B) (1 mark)

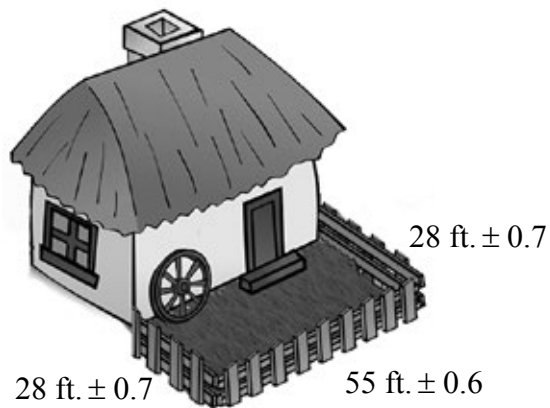
Incorrect answer in Part B

Question 33

E5.P.1

2 marks

A yard is being fenced on three sides as shown below.



Calculate the maximum length of fencing required given the measurements and the uncertainties above. (2 marks)

Answer:

$$\begin{aligned} \text{Maximum length: } & (55 + 0.6) + (28 + 0.7) + (28 + 0.7) \} \leftarrow 1 \text{ mark for process} \\ & = 55.6 + 28.7 + 28.7 \\ & = 113 \text{ ft.} \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Note to marker: Award one mark for a follow-through error only if uncertainty is included in the process.

Exemplar 1

(2 marks)

$$55 + 28 + 28 = 111$$

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

(2 marks)

$$55 + .6 = 33 \text{ ft}$$

$$28 + .7 = 28.7 \text{ ft}$$

$$33 + 28.7 = 61.7 \text{ ft}$$

Mark: 0 out of 2**Rationale:** Incorrect process
Incorrect answer**Exemplar 3**

(2 marks)

$$\begin{array}{r} 55.06 \\ 28.07 \\ + 28.07 \\ \hline 111.2 \text{ ft maximum length} \end{array}$$

Mark: 1 out of 2**Rationale:** Incorrect process
Correct answer (follow-through error) (1 mark)

Question 34

E5.P.1

1 mark

The tolerance of a measurement is 0.007 m. The nominal value, which is the maximum, is 15.084 m.

Choose an acceptable measured value from the list below:

- A) 15.091 m
- B) 15.078 m
- C) 15.098 m
- D) 15.070 m

Answer: B)



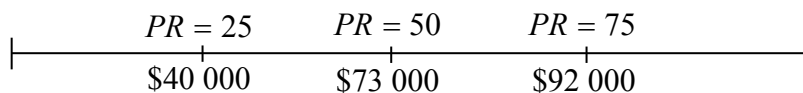
Statistics

Question 35

E5.S.2

2 marks

Statistics for family income are available for the town of St. Lamont. The family incomes for the 25th, 50th, and 75th percentile ranks are shown below.



A) State the percent of families that earn more than \$92 000. (1 mark)

Answer:

25%

B) There are 1416 families in the town of St. Lamont.

Calculate how many families earn more than \$92 000. (1 mark)

Answer:

Number of families: 1416×0.25

$= 354$

← 1 mark

Exemplar 1

(2 marks)

- A) 10% E4
- B) 141.6 families

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

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

E4 (does not use whole units in contextual questions involving discrete data)

Exemplar 2

(2 marks)

- A) 75%
- B) 1062 families

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) $1416 \times .25 = 354$
- B) 354
- $\frac{354}{1416} \times 100 = 25\%$

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

Correct answer in Part B (1 mark)

Question 36

E5.S.2

2 marks

The weights (kg) of fish caught in a fishing derby are:

1.91 2.25 2.84 2.90 3.71 4.18 4.49 4.82 5.02

Manuel caught the fish that weighed 2.90 kg.

Calculate the percentile rank of the weight of his fish. (2 marks)

Answer:

$$\left. \begin{aligned} PR &= \frac{b}{n} \times 100 \\ &= \frac{3}{9} \times 100 \\ &= 33.33 \end{aligned} \right\} \leftarrow 1 \text{ mark for all correct substitutions}$$

$\therefore 33$ or 33rd or PR_{33} $\leftarrow 1$ mark
or
34 or 34th or PR_{34}

Note to marker: Award one mark for a follow-through error only if the value of “ b ” or “ n ” is substituted correctly.

Exemplar 1

(2 marks)

$$\begin{aligned} PR &= \frac{b}{n} \times 100 \\ &= \frac{2.90}{9} \times 100 \\ &= 32.2 \end{aligned}$$

E4

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

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

E4 (does not use whole units in contextual questions involving discrete data)

Exemplar 2

(2 marks)

$$\begin{aligned} &\frac{3}{9} \times 100 \\ &= 33\% \end{aligned}$$

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

Incorrect answer

Exemplar 3

(2 marks)

$$\frac{3}{9} \times 100 = 33.33\%$$

$$PR = 33.33$$

E4

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

Correct answer (1 mark)

E4 (does not use whole units in contextual questions involving discrete data)

Question 37

E5.S.1

1 mark

A high school must report its absence rate. The table below shows the percent of students absent from September to January.

Month	September	October	November	December	January
Absence rate	3.3%	8.0%	8.3%	7.8%	7.6%

Justify whether the school should use the mean or median to promote its low absence rate.

Answer:

The school should use the mean since it will be lower than the median due to the outlier.

Note to marker: Do not accept “the mean is lower” without further justification.

OR**Answer:**

$$\begin{aligned}\text{Mean: } & \frac{3.3 + 8.0 + 8.3 + 7.8 + 7.6}{5} \\ & = 7.0\%\end{aligned}$$

$$\begin{aligned}\text{Median: } & 3.3 \quad 7.6 \quad 7.8 \quad 8.0 \quad 8.3 \\ & = 7.8\%\end{aligned}$$

The school should use the mean because it is lower.

Exemplar 1

(1 mark)

Median

mean is Average but the Average has changed dramatically

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

(1 mark)

Mean
7x

Median
7.8x

Use mean it looks lower.

Mark: 1 out of 1**Rationale:** Correct response (1 mark)**Exemplar 3**

(1 mark)

mean because September was really low month so that would bring the mean down a lot.

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

Question 38

E5.S.1

2 marks

The table below shows the number of text messages that Sajaad sent over the last few days.

Monday	Tuesday	Wednesday	Thursday	Friday
20	48	31	67	?

The mean number of text messages sent by Sajaad is 44.

Calculate the number of text messages he sent on Friday. (2 marks)

Answer:

$$\left. \begin{array}{l} 44 = \frac{20 + 48 + 31 + 67 + x}{5} \\ 220 = 166 + x \\ x = 54 \end{array} \right\} \begin{array}{l} \leftarrow 1 \text{ mark for process} \\ \leftarrow 1 \text{ mark} \end{array}$$

Note to marker: If student arrives at a correct final answer using guess and check, award full marks.

Exemplar 1

(2 marks)

$$\begin{array}{r} 20 + 48 + 31 + 67 + 49 \\ \hline 5 \end{array}$$

$$= 42$$

Mark: 0 out of 2**Rationale:** Incorrect process**Exemplar 2**

(2 marks)

$$54.$$

Mark: 1 out of 2**Rationale:** Correct final answer (no process shown) (1 mark)**Exemplar 3**

(2 marks)

$$\begin{array}{r} 20 + 48 + 31 + 67 + ? \\ \hline 5 \end{array} = 44$$

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

Question 39

E5.S.1

2 marks

Three farms in Manitoba auctioned off their cattle. The table below shows the number of cows and the price per cow for each farm.

Farm	Number of Cows	Price per Cow
Newdale	300	\$1400
Parkview	500	\$1100
Hidden Valley	1000	\$950

Calculate the average price per cow using a weighted mean. (2 marks)

Answer:

$$\frac{(\$1400 \times 300) + (\$1100 \times 500) + (\$950 \times 1000)}{1800} \quad \leftarrow 1 \text{ mark for process}$$
$$= \frac{\$1\,920\,000}{1800}$$
$$= \$1066.67 \quad \leftarrow 1 \text{ mark}$$

Note to marker: Award one mark for a follow-through error only if the value of the numerator or the denominator is substituted correctly.

Exemplar 1

(2 marks)

$$\begin{array}{r} \$400 + \$100 + \$950 \\ \hline 3 \\ \hline = \$1150 \end{array}$$

Mark: 0 out of 2**Rationale:** Incorrect process
Incorrect final answer**Exemplar 2**

(2 marks)

$$\begin{array}{r} 300 \times \$1400 \quad 420\,000 \\ + 500 \times \$1100 = \quad 550\,000 \\ 1000 \times \$950 \quad 950\,000 \end{array}$$

$$\text{mean} = \$640\,000$$

Mark: 1 out of 2**Rationale:** Incorrect process
Correct final answer (follow-through error) (1 mark)**Exemplar 3**

(2 marks)

$$\begin{array}{l} \frac{300}{1800} = 0,167 \quad \frac{500}{1800} = 0,278 \quad \frac{1000}{1800} = 0,556 \\ 0,167(1400) + 0,278(1100) + 0,556(950) = 1067,80 \end{array}$$

E6 E6 E6 E5

Mark: 2 out of 2**Rationale:** Correct process (1 mark)
Correct final answer (1 mark)
E5 (does not include units in final answer)
E6 (rounds too soon)

Question 40

E5.S.1

2 marks

Given the following salaries:

\$100 000	\$45 000	\$35 000	\$40 000	\$33 000
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A) Calculate the mean. (1 mark)

Answer:

$$\begin{aligned}\text{Mean: } & \frac{\$100\,000 + \$45\,000 + \$35\,000 + \$40\,000 + \$33\,000}{5} \\ &= \frac{\$253\,000}{5} \\ &= \$50\,600\end{aligned}$$

← 1 mark

B) Calculate the trimmed mean by removing the highest and lowest salaries. (1 mark)

Answer:

$$\begin{aligned}\text{Trimmed mean: } & \frac{\$35\,000 + \$40\,000 + \$45\,000}{3} \\ &= \frac{\$120\,000}{3} \\ &= \$40\,000\end{aligned}$$

← 1 mark

Exemplar 1

(2 marks)

A) $100\ 000 + 45\ 000 + 35\ 000 + 40\ 000 + 33\ 000$
 $= 253\ 000 \div 5 = 50600$

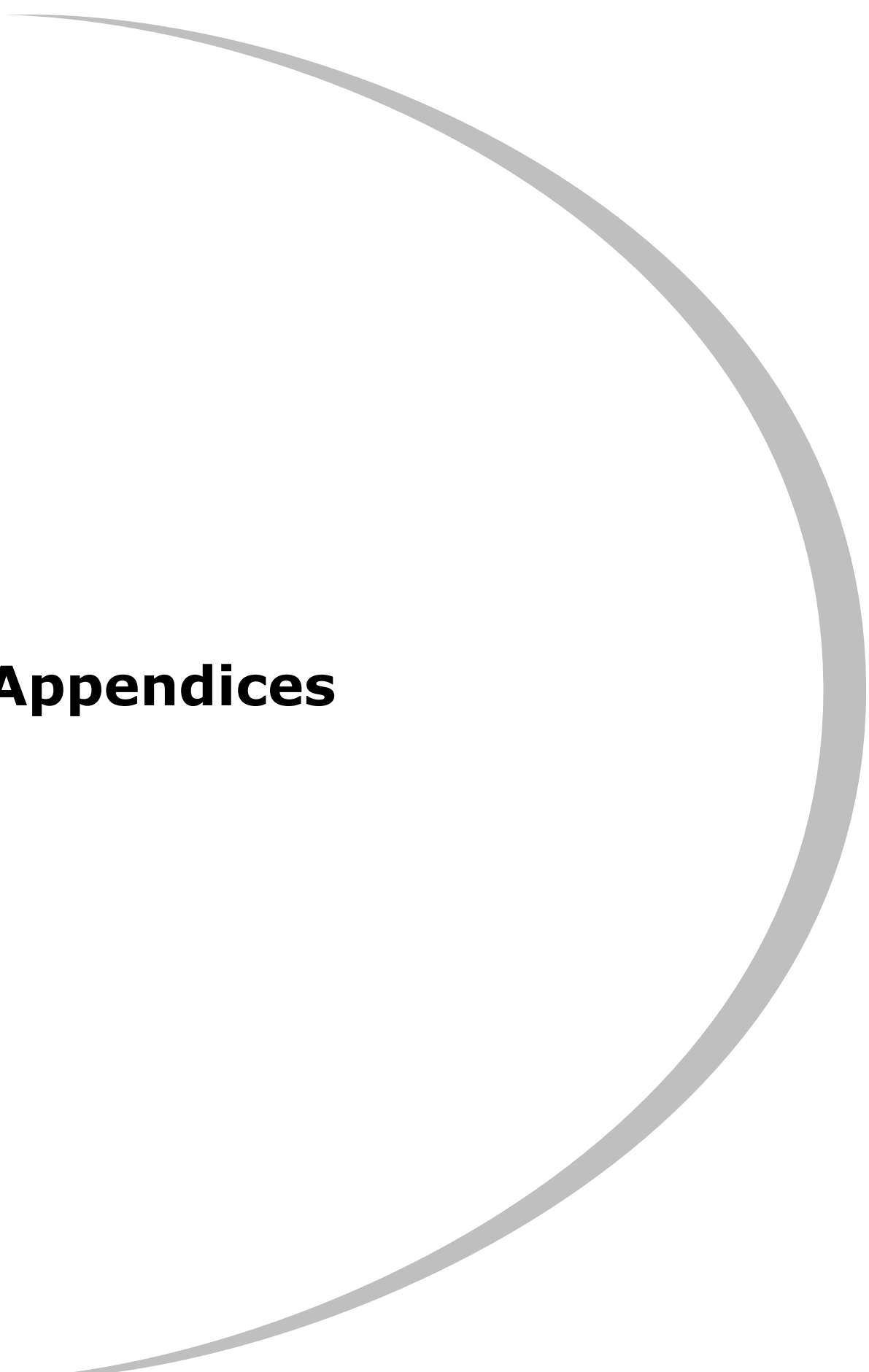
E5

E5

B) $45\ 000 + 35\ 000 + 40\ 000 = 120\ 000 \div 3 = 40\ 000$

Mark: 2 out of 2

Rationale: Correct answer in Part A (1 mark)
E5 (does not include units in final answer)
Correct answer in Part B (1 mark)
E5 (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 a)	E6.H.1	3
1 b)	E6.H.1	1
2	E6.H.1	2
3	E6.H.1	1
4	E6.H.1	1
5 a)	E6.H.1	1
5 b)	E6.H.1	1
5 c)	E6.H.1	1
6	E6.H.1	1
7 a)	E6.H.1	2
7 b)	E6.H.1	2
Total = 16		
Probability		
Question	Learning Outcome	Mark
8	E6.P.1	1
9 a)	E6.P.1	1
9 b)	E6.P.1	1
10	E6.P.1	3
11	E6.P.1	1
12	E6.P.1	2
13 a)	E6.P.1	1
13 b)	E6.P.1	1
Total = 11		
Vehicle Finance		
Question	Learning Outcome	Mark
14	E5.V.1	2
15	E5.V.1	1
16	E5.V.1	1
17	E5.V.1	1
18	E5.V.1	3
19 a)	E5.V.1	2
19 b)	E5.V.1	1
20 a)	E5.V.1	2
20 b)	E5.V.1	1
21	E5.V.1	2
22	E5.V.1	1
Total = 17		

Geometry and Trigonometry		
Question	Learning Outcome	Mark
23	E6.G.2	1
24 a)	E6.G.2	1
24 b)	E6.G.1	3
25	E6.G.2	2
26 a)	E6.G.2	1
26 b)	E6.G.1	1
27	E6.G.2	1
28	E6.G.1	3
29	E6.G.2	2
		Total = 15
Precision Measurement		
Question	Learning Outcome	Mark
30	E5.P.1	1
31 a)	E5.P.1	1
31 b)	E5.P.1	1
32 a)	E5.P.1	1
32 b)	E5.P.1	2
33	E5.P.1	2
34	E5.P.1	1
		Total = 9
Statistics		
Question	Learning Outcome	Mark
35 a)	E5.S.2	1
35 b)	E5.S.2	1
36	E5.S.2	2
37	E5.S.1	1
38	E5.S.1	2
39	E5.S.1	2
40 a)	E5.S.1	1
40 b)	E5.S.1	1
		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 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: _____

For Department Use Only—After Marking Complete

Consultant: _____

Date: _____

Appendix C:

Communication 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 (Final Answer)

- final answer not clearly indicated (e.g., 3/4 and 3:1 presented, but final answer not indicated)
- answer is presented in another part of the question
- too much information is presented in the answer and the information is numerically and conceptually correct (If contradictory information is provided, no mark is awarded.)

E2 (Notation)

- dimensions written in an alternative form than requested (e.g., write the tolerance in the form nominal value $\pm \frac{1}{2}$ tolerance and student gives maximum $\begin{matrix} + 0 \\ - \text{tolerance} \end{matrix}$)
- answer expressed in an alternative form than requested (e.g., express probability as a percentage and student gives a decimal form)

E3 (Transcription/Transposition)

- makes a transcription error (inaccurate transferring of information from one part of the page to another)
- makes a transposition error (changing order of digits)

E4 (Whole Units)

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

E5 (Units)

- uses incorrect units of measure
- does not include units in final answer (e.g., missing dollar sign for monetary values, missing degrees for angles)
- answer stated in gradians or radians instead of degrees

E6 (Rounding)

- rounds incorrectly
- rounds too soon
- does not express the answer to the appropriate number of decimal places (e.g., monetary values are not expressed to two decimal places)