

Grade 12  
Essential Mathematics  
Achievement Test

# **Marking Guide**

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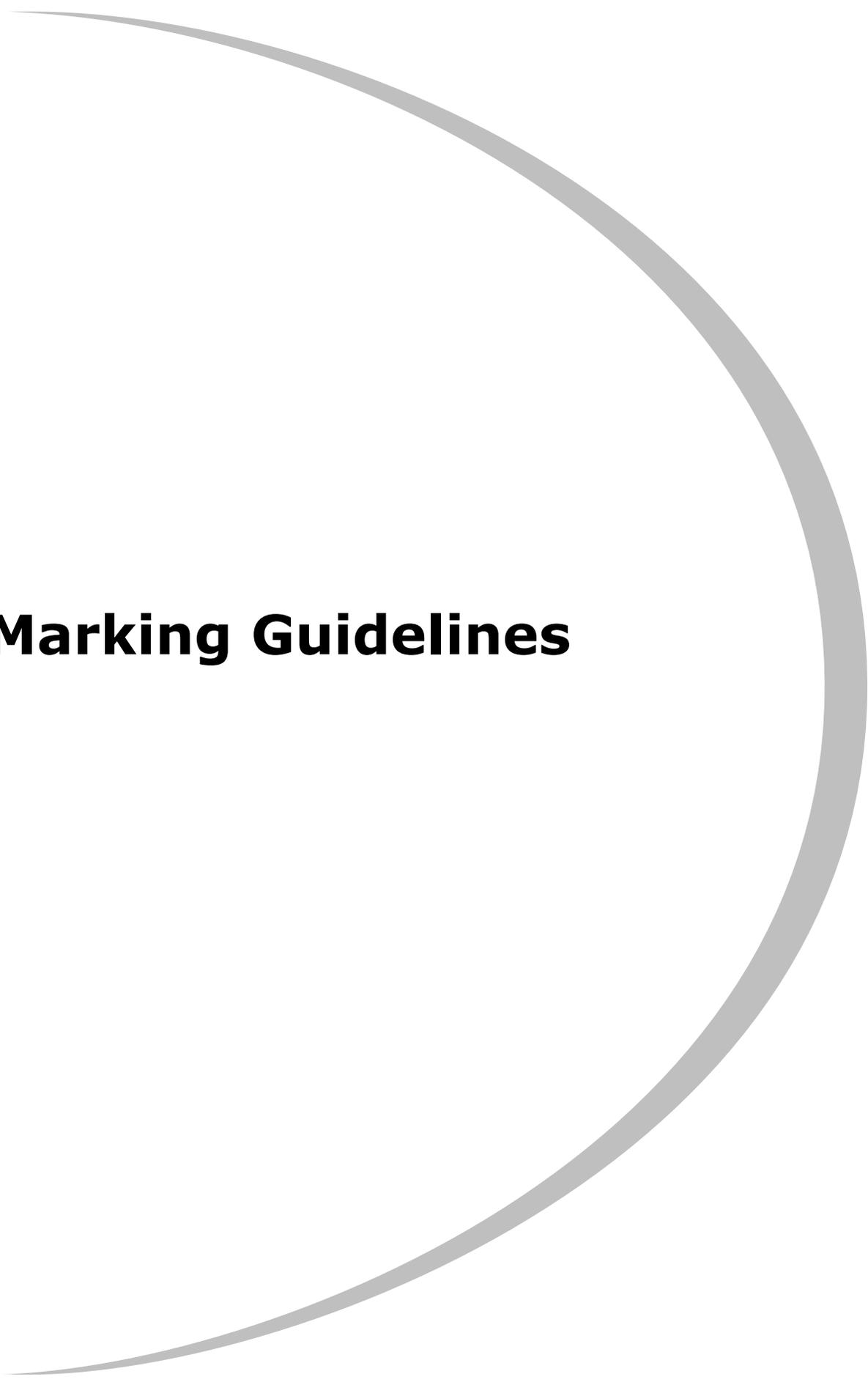
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Available in alternate formats upon request.

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# **Marking Guidelines**



# Marking Guidelines

The *Grade 12 Essential Mathematics Achievement Test: Marking Guide (January 2018)* 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
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Final Answer/ Réponse finale	Notation	Transcription/ Transposition	Whole Units/ Unités entières	Units/ Unités	Rounding/ Arrondissement

Test mark / Note au test :	<u>56</u>	-	<u>1</u>	=	<u>55</u>
	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” 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

1 mark

Cia bought a house for \$298 500. She made the minimum down payment of 5%.

Calculate the amount of Cia's down payment.

**Answer:**

$$0.05 \times \$298\,500$$

$$= \$14\,925$$

← 1 mark

**Exemplar 1**

(1 mark)

$$298,500 \times .5 = 14,900$$

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

(1 mark)

$$\begin{array}{l} \frac{5}{100} = \frac{298,500}{1} \quad \text{or} \quad \frac{5}{100} \times 298,500 \\ = \frac{298,500 \times 100}{5} \\ = \frac{29850000}{5} \\ \underline{\underline{\$970,000}} \end{array}$$
$$\begin{array}{l} 0.05 \times 298,500 \\ \underline{\underline{\$14,925}} \end{array}$$

**Mark: 0 out of 1****Rationale:** Incorrect answer (contradictory information is provided)**Exemplar 3**

(1 mark)

E3

$$(298000 \div 100) \times 5$$

$$\underline{\underline{\$14900}}$$

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

E3 (makes a transcription error)

**Question 2**

E6.H.1

1 mark

Blair plans to buy a house. He is considering the following 2 similar houses.

	<b>House A</b>	<b>House B</b>
<b>Cost</b>	\$250 000	\$240 000
<b>Furnace</b>	New furnace (high efficiency)	Used furnace (needs replacing in 5 years at a cost of \$10 000)

Justify which house Blair should buy with reference to the heating costs over time.

**Sample answers:**

- Blair should choose House A because even though the house is more expensive, he will save on heating costs in the long term due to the high efficiency furnace.
- Blair should choose House B because even if his monthly heating costs are higher, he will save \$10 000 initially and has 5 years to save up for a new furnace.

**Exemplar 1**

(1 mark)

Since the used furnace needs to be replaced in 5 years, we can assume the new furnace will last longer, which could possibly result in having ~~less~~ less maintenance costs in the future.

**Mark: 0 out of 1****Rationale:** Incorrect response (does not reference heating costs)**Exemplar 2**

(1 mark)

He should go with house A because he will eventually have to replace the furnace. It is also high efficiency so he will save money on hydro.

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

**Exemplar 3**

(1 mark)

With the new furnace, house B ends up being the same price, but if he waits the 5 years to replace it, he will most likely be paying a larger hydro bill until then. So he should go with house A because it ends up being less expensive and he doesn't have to worry about replacing the furnace.

**Mark: 1 out of 1****Rationale:** Correct response (1 mark)**Exemplar 4**

(1 mark)

BLAIR SHOULD CHOOSE HOUSE B BECAUSE IF HE DOESN'T STAY IN THE HOUSE VERY LONG, THE HEATING COSTS WILL NOT ADD UP TO \$10,000.

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



**Question 3**

E6.H.1

2 marks

Mamadou's house insurance policy has a deductible of \$1000. The annual premium is \$1500. If no claim is made during the year, he receives a 10% discount on the premium the following year.

Calculate the total amount paid over the 2 year period, before taxes.

Summary	
Year 1	no claim made
Year 2	claim made

**Answer:**

Year 1: \$1500

Year 2:  $\$1500 - \$150 + \$1000$  $= \$2350$  ← 1 markTotal cost:  $\$1500 + \$2350$  $= \$3850$  ← 1 mark**OR****Answer:** $2 \times \$1500 - \$150 + \$1000$  ← 1 mark for process $= \$3850$  ← 1 mark

**Exemplar 1**

(2 marks)

$$1000 \times 0.1 = 100$$

$$1000 - 100 = 900$$

1000

$$900 + 1000 = 1900$$

Mariamah paid \$1,900.00 to the insurance company over the 2 years

**Mark: 0 out of 2**

**Rationale:** Incorrect Year 2 amount  
Incorrect total cost (does not add Year 1)

**Exemplar 2**

(2 marks)

Summary	
Year 1	no claim made
Year 2	claim made

\$1500

\$ -10% = \$1350

$$\$1500 + \$1350 = \boxed{\$2850}$$

**Mark: 1 out of 2**

**Rationale:** Incorrect Year 2 (does not add deductible)  
Correct total cost (follow-through error) (1 mark)

**Exemplar 3**

(2 marks)

Year 1 = \$1500.00 - Premium

Year 2 = \$1350.00 - Premium

Year 2 = \$1000.00 - Deductible

\$3850.00

**Mark: 2 out of 2**

**Rationale:** Correct Year 2 amount (1 mark)  
Correct total cost (1 mark)



**Question 4**

E6.H.1

3 marks

A property has a portioned assessment of \$198 000. The municipal tax rate is 18.2 mills. Education taxes are \$1960. The property has a frontage of 45 feet. There is a local improvement levy of \$9.42 per foot for lane paving.

Calculate the total taxes due if the provincial tax credit is \$700.

**Answer:**

$$\left. \begin{array}{l} \text{Municipal tax: } \frac{18.2}{1000} \times \$198\,000 \\ = \$3603.60 \end{array} \right\} \leftarrow 1 \text{ mark}$$

$$\left. \begin{array}{l} \text{Local improvements: } 45 \times \$9.42 \\ = \$423.90 \end{array} \right\} \leftarrow 1 \text{ mark}$$

Education tax: \$1960

$$\begin{array}{l} \text{Total tax: } \$3603.60 + \$423.90 + \$1960 - \$700 \\ = \$5287.50 \end{array} \leftarrow 1 \text{ mark}$$

**Exemplar 1**

(3 marks)

$$\begin{array}{r} 198,000 \\ + 1,960 \\ + 18.2 \\ \hline 200,402.1 \\ - 900 \\ \hline \hline \$ 199,902.1 \end{array}$$

$45 \times 9.42 = 423.9$

**Mark: 1 out of 3**

**Rationale:** Incorrect municipal tax  
Correct local improvement (1 mark)  
Incorrect total tax (does not add local improvements)

**Exemplar 2**

(3 marks)

$$\begin{array}{r} 198,000 \times .182 = 36,036 \\ 1,960 \\ 9.42 \times 45 = 423.9 \\ + \\ \hline 38,419.9 \end{array}$$

$45 \times 9.42 = 423.9$

$\$ 38,419.90$

**Mark: 1 out of 3**

**Rationale:** Incorrect municipal tax  
Correct local improvement (1 mark)  
Incorrect total tax (does not deduct tax credit)

**Exemplar 3**

(3 marks)

$$\begin{aligned} \text{TPT} &= \left( 18.2 \text{ mills} \cdot \frac{198,000}{1000} \right) + \$423.90 - 700 \\ &= 3603.6 + (-276.10) \\ &= \boxed{\$3327.50} \end{aligned}$$

**Mark: 2 out of 3****Rationale:** Correct municipal tax (1 mark)

Correct local improvement (1 mark)

Incorrect total tax (does not include education tax)



**Question 5**

E6.H.1

1 mark

Explain why a bank usually limits the Gross Debt Service Ratio (GDSR) to 32% when determining if a homebuyer will be approved for a mortgage.

**Sample answers:**

- If you spend more than 32% of your income on financing your home, you may not have enough money for other expenses.
- 32% has been statistically shown to allow for a comfortable financial situation.

**Exemplar 1**

(1 mark)

If the buyer is using more than 32% of their income then they aren't suitable for a mortgage

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

(1 mark)

The bank would use the 32% to determine because they don't want to give someone a loan if they won't be able to pay it back.

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

(1 mark)

The bank is investing in you if they approve your mortgage. People who are above the 32% threshold are considered "house poor" and are a larger liability to the bank.

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

**Question 6**

E6.H.1

3 marks

Darcy and Marco have qualified for a \$300 000 mortgage with two payment options.  
Option 1 is a 4.5% loan for 25 years with a monthly rate of \$5.50 per thousand borrowed.  
Option 2 is a 6.5% loan for 20 years during which they would have paid a total of \$482 400.

A) Calculate the monthly mortgage payment for Option 1. (1 mark)

**Answer:**

$$\begin{aligned} \text{Monthly mortgage payment: } & \frac{\$5.50 \times \$300\,000}{\$1000} \\ & = \$1650 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

B) Calculate the total amount paid over the 25 years in Option 1. (1 mark)

**Answer:**

$$\begin{aligned} \text{Total amount paid: } & \$1650 \times 12 \times 25 \\ & = \$495\,000 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

C) Justify why Darcy and Marco might choose Option 1 instead of Option 2. (1 mark)

**Sample Answers:**

- Although Option 1 is more expensive in the long run, it is more affordable as a monthly payment.
- $\frac{\$482\,400}{12 \times 20} = \$2010/\text{month}$ . Since \$1650 is less than \$2010, they should choose Option 1.

**Exemplar 1**

(3 marks)

A)  $5.50 \div 300.000 = 183,33$   
 $183,33 \text{ a month}$

B) 45 8,325

C) The payments would be lower in option 1 than 2

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

Incorrect answer in Part B

Correct response in Part C (1 mark)

**Exemplar 2**

(3 marks)

A)  $300,000 \times 4.5\% \times 25 = \$337500$

$$\frac{337500 \times 5.50}{1000} = 1856.25$$

$$\begin{array}{r} \$337500 \\ 1856.25 \\ \hline 339,356.25 \end{array}$$

$$339,356.25 \div 25 = 13574.25 \text{ Year}$$

$$13574.25 \div 12 = \$1131.19 \text{ month}$$

monthly payment \$1131.19

B)  $1131.19 \times 12 \times 25 = \$339357.00$

C) Option one would be the option to choose because the amount paid back is lower than option two.

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

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

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

**Exemplar 3**

(3 marks)

A) 
$$\frac{300,000 \times 5.50}{1000} = \$1650.00$$

$$= 1650 \times 12 \times 25$$

$$= \underline{\underline{\$495,000.00}}$$

E1

B) 
$$1650 \times 12 \times 25 = \underline{\underline{\$495,000.00}}$$

C) *lower payments due too more time  
to pay the mortgage*

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

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

Correct answer in Part B (1 mark)

Correct response in Part C (1 mark)



**Question 7**

E6.H.1

1 mark

Preventative home maintenance can help a homeowner avoid expensive emergency repairs.

Describe 1 preventative maintenance task that you can do to ensure the roof of your house remains in good condition.

**Sample answers:**

- remove snow
- clean gutters
- remove branches/leaves
- fix damaged shingles

**Exemplar 1**

(1 mark)

shingling your roof

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

(1 mark)

Regularly checking roof shingles to ensure there is no lifting, curling, or leaking.

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

(1 mark)

shoveling snow off of it

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

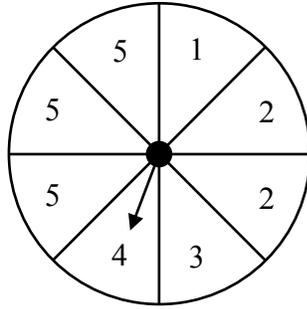
# Probability

## Question 8

E6.P.1

2 marks

Given the following spinner:



A) State the probability, in fraction form, of the spinner landing on 4. (1 mark)

**Answer:**

$$\frac{1}{8}$$

**Note to marker:** Accept equivalent fractions.

B) State the probability, as a percent, of the spinner landing on a number less than 4. (1 mark)

**Answer:**

50%

**Exemplar 1**

(2 marks)

A)  $1/8$

B)  $0.5\%$

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

Incorrect answer in Part B

**Exemplar 2**

(2 marks)

A)  $P_{(4)} = \frac{1}{8}$

B) 
$$p = \frac{4}{8}$$
$$= 0.50$$
$$= 50\%$$

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

Correct answer in Part B (1 mark)

**Question 9**

E6.P.1

1 mark

A company states that the theoretical probability of manufacturing a defective calculator is 1.3%. Natalie samples 200 calculators and finds that 4% of them are defective. She immediately takes a second sample of 1000 calculators and finds that 1.8% of them are defective.

**Natalie's Results**

	<b>Sample Size</b>	<b>Percent Defective</b>
Sample 1	200	4%
Sample 2	1000	1.8%

Explain why her second sample is closer to the theoretical probability than her first.

**Answer:**

The larger sample should be closer to the theoretical probability.

**Exemplar 1**

(1 mark)

Because she tested more so she has more variables.

**Mark: 0 out of 1**

**Rationale:** Incorrect response

**Exemplar 2**

(1 mark)

because there are more calculators

**Mark: 1 out of 1**

**Rationale:** Correct response (1 mark)

**Exemplar 3**

(1 mark)

The bigger the sample the more accuracy there is. When she only tested 200 calculators it was coincidence that she happened to choose 40% that were defective. She needed a larger sample.

**Mark: 1 out of 1**

**Rationale:** Correct response (1 mark)

**Question 10**

E6.P.1

1 mark

The probability of being selected as a jury member is 0.07.

Calculate the probability, in decimal form, of **not** being selected.

**Answer:**

$$1 - 0.07$$

$$= 0.93 \quad \leftarrow 1 \text{ mark}$$

**Exemplar 1**

(1 mark)

$$100 - 0.07 = 99.93$$

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

(1 mark)

$$P(\text{in favor}) = \frac{7}{100} \text{ or } 0.07$$

$$P(\text{against}) = \frac{93}{100} \text{ or } 0.93$$

Not becoming a guy needs 0.93

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

**Question 11**

E6.P.1

1 mark

State the odds **against** a soccer game ending in a tie score if the probability of a tie is  $\frac{9}{225}$ .

**Answer:**

216 : 9 or 216 to 9

**Exemplar 1**

(1 mark)

$$\text{probability} = \frac{9 \rightarrow \# \text{ ways can occur}}{225 \rightarrow \text{total possible outcomes}}$$

$$\text{odds against} = \frac{\# \text{ of ways}^{\text{can}} \text{ not occur}}{\# \text{ of ways can occur}}$$

$$= \frac{216}{9}$$

$$\text{odds against} = \boxed{216 : 9}$$

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

**Question 12**

E6.P.1

1 mark

The probability of having green eyes is 3 out of 25.

Calculate the expected number of people who have green eyes in a group of 150 people.

**Answer:**

$$\begin{aligned} P(\text{green}) &= \frac{3}{25}(150) \\ &= 18 \text{ people} \end{aligned}$$

← 1 mark

**Exemplar 1**

(1 mark)

E4

18:150

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

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

**Exemplar 2**

(1 mark)

$$\frac{3}{25} \neq \frac{x}{150}$$

$$= 25x = 150 \times 30$$

$$= \frac{450}{25}$$

$$= 18$$

$$= \frac{18}{150}$$

E1

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

E1 (too much information is presented in the answer)

**Question 13**

E6.P.1

3 marks

“Pick the Marble” is a game that involves picking one marble out of a bag. In the bag, 32% of the marbles are red, 4% are green, and 64% are blue. It costs \$2 to play, and the prizes are listed in the table below.

**Pick the Marble**

Colour	Probability of Winning	Prizes
Red	32%	Stuffed animal valued at \$10
Green	4%	Stuffed animal valued at \$15
Blue	64%	Nothing

Calculate the expected value for the game.

**Answer:**

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

$$= 0.32(\$8) + 0.04(\$13) - 0.64(\$2) \left\{ \begin{array}{l} \text{No mark for 1 or 2 correct substitutions} \\ \text{or} \\ \text{1 mark for 3, 4, or 5 correct substitutions} \\ \text{or} \\ \text{2 marks for all correct substitutions} \end{array} \right.$$

$$= \$2.56 + \$0.52 - \$1.28$$

$$= \$1.80$$

← 1 mark

**OR****Answer:**

$$\text{Average winnings: } 0.32(\$10) + 0.04(\$15) + 0.64(\$0) \left\{ \leftarrow 1 \text{ mark for process} \right.$$

$$= \$3.20 + \$0.60 + \$0$$

$$= \$3.80$$

← 1 mark

$$\text{Expected value: } \$3.80 - \$2$$

$$= \$1.80$$

← 1 mark

**Exemplar 1**

(3 marks)

$$(32 \times 10) + (4 \times 15) + (64 \times 0)$$

↓

$$320 + 60 + 0$$

$$EV = 380$$

**Mark: 1 out of 3****Rationale:** Incorrect process

Correct average winnings (follow-through error) (1 mark)

Incorrect expected value

**Exemplar 2**

(3 marks)

	$EV =$ cost	Win		P	$P(x)$
Red	\$2	\$10	\$8	$\frac{32}{100}$	$\frac{256}{100}$
Green	\$2	\$15	\$13	$\frac{4}{100}$	$\frac{52}{100}$
Blue	\$2	\$0	-\$2	$\frac{64}{100}$	$\frac{128}{100}$

$$EV = \frac{256}{100} + \frac{52}{100} - \frac{128}{100}$$

$$= \frac{180}{100} = \$1.80$$

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

Correct expected value (1 mark)

**Exemplar 3**

(3 marks)

$$(0.32) \times (10) + (0.09) \times (15) + (0.64) \times (0) - (1)(2)$$

$$3.2 + 0.6 + 0 - 2$$

1.8

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

Correct average winnings (1 mark)

Correct expected value (1 mark)

E5 (does not include units in final answer)

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



**Question 14**

E6.P.1

3 marks

Each letter of the word **MULTIPLICATION** is written on a different card. The cards are shuffled and placed face down on a table. One card is selected and then replaced.

A) State the probability of selecting a card with the letter L or P. (1 mark)

**Answer:**

$\frac{3}{14}$  or 0.21 or 21.43% or three out of fourteen

**Note to marker:** Accept equivalent representations.

B) State the odds in favour of selecting a card with the letter A. (1 mark)

**Answer:**

1 : 13 or 1 to 13

**Notes to marker:** Accept equivalent representations.

Even though students are encouraged to express odds in the form “for : against”, award 1 mark for odds expressed in the form “ $\frac{\text{for}}{\text{against}}$ ”.

C) State the odds **against** selecting a card with a vowel (A, E, I, O, U). (1 mark)

**Answer:**

8 : 6 or 8 to 6

**Notes to marker:** Accept equivalent representations.

Even though students are encouraged to express odds in the form “against : for”, award 1 mark for odds expressed in the form “ $\frac{\text{against}}{\text{for}}$ ”.

**Exemplar 1**

(3 marks)

A)  $3:14$

B)  $1:14$

C)  $8:14$

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

Incorrect answer in Part B

Incorrect answer in Part C

**Exemplar 2**

(3 marks)

A)  $L = \frac{2}{14}$        $P = \frac{1}{14}$

B) odd of A =  $1:13$

C)  $8:6$

**Mark: 2 out of 3****Rationale:** Incorrect answer in Part A (misinterpretation of the word “or”)

Correct answer in Part B (1 mark)

Correct answer in Part C (1 mark)

# Vehicle Finance

## Question 15

E5.V.1

2 marks

Shania wants to know how much tax she will pay on a new vehicle if she buys a \$17 000 vehicle and trades in her current vehicle valued at \$4000.

Calculate the **amount of tax** she will pay for this new vehicle.

**Answer:**

$$\begin{aligned} \text{Pre-tax value: } & \$17\,000 - \$4000 \\ & = \$13\,000 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Amount of tax: } & 0.13 \times \$13\,000 \\ & = \$1690 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

**Exemplar 1**

(2 marks)

$$\begin{array}{r} .13 \times 17000 = 2210 \\ - 4000 \\ \hline \$15210 \end{array}$$

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

(2 marks)

$$\begin{array}{r} \$17000 \\ - \$4000 \\ \hline 13000 \\ 13000 \times 1.13 = \$14690 \end{array}$$

**Mark: 1 out of 2****Rationale:** Correct pre-tax value (1 mark)  
Incorrect final answer

**Question 16**

E5.V.1

2 marks

Describe 2 advantages of leasing a car rather than financing the purchase of a similar new car.

Place one response per line.

1. \_\_\_\_\_

2. \_\_\_\_\_

**Sample answers:**

- lower monthly payment
- rarely have to pay for the long-term maintenance costs on car (brakes, timing belt, suspension)
- leasing allows for a more convenient car replacement
- pay tax on monthly payments not on the full price of the vehicle

(2 x 1 mark)

**Exemplar 1**

(2 marks)

1. You get a new car in awhile
2. you dont do maintnace on it

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

(2 marks)

1. You may not have the money to purchase a car
2. Sometimes it's cheaper than buying a car

**Mark: 0 out of 2****Rationale:** Incorrect responses**Exemplar 3**

(2 marks)

1. warranty.
2. Cheaper monthly payments.

**Mark: 1 out of 2****Rationale:** Correct response (cheaper monthly payments) (1 mark)

**Question 17**

E5.V.1

3 marks

Jean is financing the purchase of a new vehicle. She has saved money for the down payment. The table below shows the details of the purchase.

Price of new vehicle	\$26 000
Trade-in value of current vehicle	\$2000
Tax	\$3120
Down payment	\$3000
Monthly payment	\$544.39
Term	48 months

A) Calculate the total amount borrowed. (1 mark)

**Answer:**

$$\begin{aligned}\text{Amount borrowed: } & \$26\,000 - \$2000 + \$3120 - \$3000 \\ & = \$24\,120 \qquad \leftarrow 1 \text{ mark}\end{aligned}$$

B) Calculate the total monthly payments paid over the term of the loan. (1 mark)

**Answer:**

$$\begin{aligned}\text{Total monthly payments: } & \$544.39 \times 48 \\ & = \$26\,130.72 \qquad \leftarrow 1 \text{ mark}\end{aligned}$$

C) Calculate the finance charge (interest). (1 mark)

**Answer:**

$$\begin{aligned}\text{Finance charge: } & \$26\,130.72 - \$24\,120 \\ & = \$2010.72 \qquad \leftarrow 1 \text{ mark}\end{aligned}$$

**Exemplar 1**

(3 marks)

A)  $26000 - 2000 = 24000$

B)

C)

**Mark: 0 out of 3****Rationale:** Incorrect answer in Part A

No response in Parts B and C

**Exemplar 2**

(3 marks)

A)  $26000 - 3000 = 23000$

E5

B)  $(544.39)(48) = 26130.72$

C)  $26130.72 - 23000 = 3130.72$

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

Correct answer in Part B (1 mark)

E5 (does not include units in final answer)

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

**Question 18**

E5.V.1

2 marks

Hugo is going to lease a car. He will pay \$384.20 per month, after taxes, for 36 months. He will make a down payment of \$1500.

Calculate the total cost paid by Hugo at the end of the 36-month lease.

**Answer:**

$$\left. \begin{array}{l} \text{Total monthly payments: } \$384.20 \times 36 \\ \qquad \qquad \qquad = \$13\,831.20 \end{array} \right\} \leftarrow 1 \text{ mark for process}$$

$$\begin{array}{l} \text{Total cost: } \$13\,831.20 + \$1500 \\ \qquad \qquad \qquad = \$15\,331.20 \qquad \qquad \qquad \leftarrow 1 \text{ mark} \end{array}$$

**Exemplar 1**

(2 marks)

$$384.20 \times 36 = 13,831.20$$
$$-1500 = \$12,331.20$$

**Mark: 1 out of 2****Rationale:** Correct total monthly payments (1 mark)  
Incorrect total cost**Exemplar 2**

(2 marks)

$$384.20 \times 36 = \$13831.2$$

**Mark: 1 out of 2****Rationale:** Correct total monthly payments (1 mark)  
Incorrect total cost**Exemplar 3**

(2 marks)

$$384.20 \times 36 + 1500$$
$$= \$15\,331.20$$

**Mark: 2 out of 2****Rationale:** Correct total monthly payments (1 mark)  
Correct total cost (1 mark)

**Question 19**

E5.V.1

2 marks

Describe 2 factors, other than the make, model, and year of the vehicle, that can affect the cost of your car insurance.

Place one response per line.

1. \_\_\_\_\_

2. \_\_\_\_\_

**Sample answers:**

- driving record (merit position on MPI's Driver Safety Rating system)
- where you drive the vehicle
- type of insurance (pleasure, all purpose, etc.)
- amount of deductible
- amount of 3rd party liability insurance
- where you live
- number of at-fault accidents
- excess value coverage on vehicles over \$50 000

(2 x 1 mark)

**Exemplar 1**

(2 marks)

1. Model, age of the vehicle.
2. original price of vehicle.

**Mark: 1 out of 2****Rationale:** Correct response (original price of vehicle) (1 mark)**Exemplar 2**

(2 marks)

1. Year
2. Your merits

**Mark: 1 out of 2****Rationale:** Correct response (your merits) (1 mark)**Exemplar 3**

(2 marks)

1. Driving record
2. location

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

**Question 20**

E5.V.1

2 marks

José and Shurjeel went on a road trip and recorded the following information:

	<b>Distance Driven</b>	<b>Amount of Gas Used</b>	<b>Cost</b>
Monday	1200 km	45 L	\$49.50
Tuesday	800 km	38 L	\$19.00
Wednesday	1400 km	47 L	\$34.00
Total	3400 km	130 L	\$102.50

A) Calculate the fuel economy for the trip in L/100 km. (1 mark)

**Answer:**

$$\begin{aligned} FE &= \frac{130 \text{ L}}{3400 \text{ km}} \times 100 \\ &= 3.82 \text{ L/100 km} \quad \leftarrow 1 \text{ mark} \end{aligned}$$

B) Calculate the cost of gas per litre for the trip. (1 mark)

**Answer:**

$$\begin{aligned} \text{Cost of gas: } & \frac{\$102.50}{130 \text{ L}} \\ &= \$0.79/\text{L} \quad \leftarrow 1 \text{ mark} \end{aligned}$$

**Exemplar 1**

(2 marks)

A)  $\frac{\text{L}}{\text{km}} \times 100$   
 $\frac{45}{1200} = 3.75 \text{ L per } 100 \text{ km}$

B)  $79\text{¢ a L} = 102.50\text{\$} \div 130 = 0.78846\text{\$}$   
 $= 0.79\text{¢}$  E5

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

Correct answer in Part B (1 mark)

E5 (uses incorrect units of measure)

**Exemplar 2**

(2 marks)

A)  $\frac{130\text{L}}{3400} \times 100 = 3.8\text{L}/100\text{km}$  E6

B)  $\frac{102.50}{3} = 34.17$

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

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

Incorrect answer in Part B

**Question 21**

E5.V.1

3 marks

Alise is taking her car in for servicing. She needs the oil changed and an air filter replaced. The cost of labour is \$95 per hour. The following table shows the details of the servicing.

Parts	Cost of Parts	Labour Hours Required
Oil and filters	\$50	0.5

Calculate the total cost Alise will pay after taxes.

**Answer:**

$$\text{Labour: } 0.5 \times \$95 = \$47.50 \quad \leftarrow 1 \text{ mark for labour cost}$$

$$\text{Parts: } \quad \quad \quad \underline{\$50.00}$$

$$\text{Subtotal: } \quad \quad \quad \$97.50 \quad \leftarrow 1 \text{ mark for subtotal}$$

$$\text{Total: } \$97.50 \times 1.13$$

$$= \$110.18 \quad \leftarrow 1 \text{ mark}$$

**OR****Answer:**

$$\text{Labour: } 0.5 \times \$95 = \$47.50 \quad \leftarrow 1 \text{ mark for labour cost}$$

$$\left. \begin{array}{l} \text{Taxes: } \$47.50 \times 1.13 = \$53.68 \\ \quad \quad \quad \$50.00 \times 1.13 = \$56.50 \end{array} \right\} \quad \leftarrow 1 \text{ mark for tax calculations}$$

$$\text{Total: } \$53.68 + \$56.50$$

$$= \$110.18 \quad \leftarrow 1 \text{ mark}$$

**Exemplar 1**

(3 marks)

\$ 50

0.5

$$95 \div 2 = 47.5$$

$$\begin{array}{r} 47.5 \\ + 95 \\ \hline \end{array}$$

$$\boxed{\$142.5}$$

**Mark: 1 out of 3****Rationale:** Correct labour cost (1 mark)

Incorrect subtotal

Incorrect final answer

**Exemplar 2**

(3 marks)

parts

labour

$$.5 \times 95 = 47.5 \quad \# \times 1.13 = 53.675$$

$$\begin{array}{r} 50 \# \times 1.13 \\ \hline 56.50 \# \end{array}$$

**Mark: 2 out of 3****Rationale:** Correct labour cost (1 mark)

Correct tax calculations (1 mark)

Final answer not shown

**Exemplar 3**

(3 marks)

$$\begin{array}{r} 50 \\ 95 \times .5 = 47.50 \\ + \\ \hline \$ 97.50 \end{array}$$

**Mark: 2 out of 3**

**Rationale:** Correct labour cost (1 mark)  
Correct subtotal (1 mark)  
Incorrect final answer



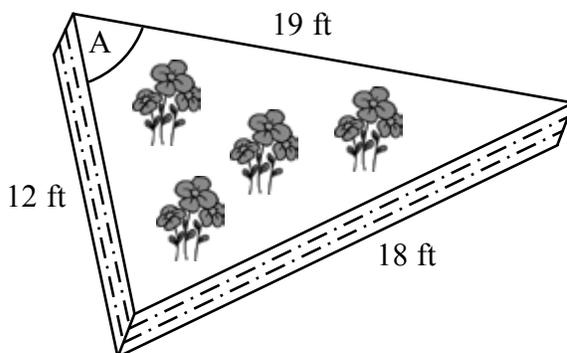
# Geometry and Trigonometry

## Question 22

E6.G.1

3 marks

George needs to build walls to support his garden. The dimensions of the garden are indicated below.



Determine the measure of angle A in George's garden.

**Answer:**

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc} \quad \leftarrow 1 \text{ mark for identification of cosine law}$$

$$\cos A = \frac{12^2 + 19^2 - 18^2}{2(12)(19)}$$

$$\cos A = \frac{181}{456}$$

$$A = \cos^{-1}(0.3969\dots)$$

$$A = 66.61^\circ$$

$\left. \begin{array}{l} \cos A = \frac{12^2 + 19^2 - 18^2}{2(12)(19)} \\ \cos A = \frac{181}{456} \\ A = \cos^{-1}(0.3969\dots) \end{array} \right\} \leftarrow 1 \text{ mark for process/substitution}$

$\leftarrow 1 \text{ mark}$

**Exemplar 1**

(3 marks)

$$\begin{aligned}\cos A &= \frac{(b^2 + c^2 - a^2)}{(2(b)(c))} \\ \cos A &= \frac{(18^2 + 12^2 - 19^2)}{(2(18)(12))} \\ \angle A &= 75.66^\circ\end{aligned}$$

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

Incorrect process/substitution

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

**Exemplar 2**

(3 marks)

$$\begin{aligned}\cos A &= \frac{(b^2 + c^2 - a^2)}{(2bc)} \\ A &= 66.6^\circ \quad \text{E6}\end{aligned}$$

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

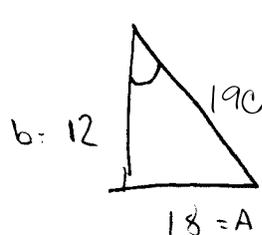
Process/substitution not shown

Correct final answer (1 mark)

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

**Exemplar 3**

(3 marks)



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

$$\cos A = \frac{12^2 + 19^2 - 18^2}{2(12)(19)}$$

$$\cos A = \frac{181}{456}$$

$$\cos^{-1}(0.3969\dots) = \angle A$$

$$\angle A = 66.61^\circ$$

$$\angle A = 67^\circ \quad \text{E6}$$

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

Correct process/substitution (1 mark)

Correct final answer (1 mark)

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

**Exemplar 4**

(3 marks)

$$\cos A = \frac{(b^2 + c^2 - a^2)}{(2bc)} = 0.39 \quad \text{E6}$$

$$\cos^{-1} 0.39 = 67.05 \quad \text{E5}$$

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

Correct process/substitution (1 mark)

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

E5 (does not include units in final answer)

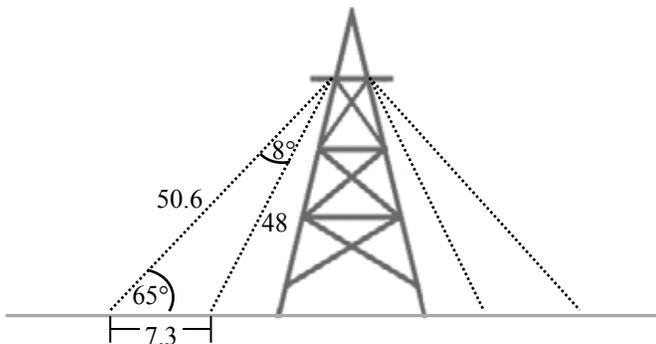
E6 (rounds too soon)

**Question 23**

E6.G.1

1 mark

Given the following diagram of a tower with supporting wires:



Identify which of the following is true.

A)  $\frac{\sin 8^\circ}{48} = \frac{\sin 65^\circ}{50.6}$

B)  $\frac{\sin 8^\circ}{50.6} = \frac{\sin 65^\circ}{48}$

C)  $50.6^2 = 7.3^2 + 48^2 - [(2)(7.3)(48)\cos 8^\circ]$

D)  $7.3^2 = 48^2 + 50.6^2 - [(2)(48)(50.6)\cos 8^\circ]$

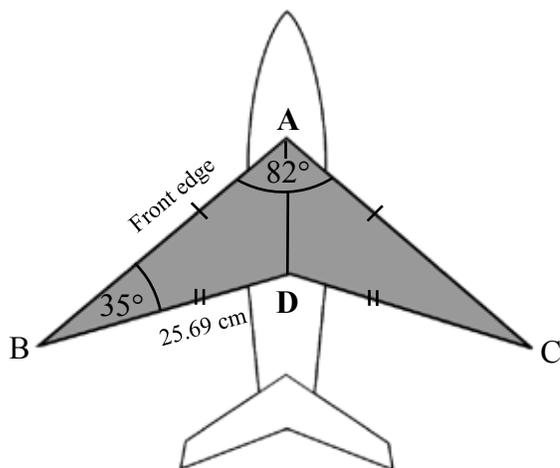
**Answer:**     D)

**Question 24**

E6.G.1

4 marks

Margo is building a model airplane. The measure of  $\angle BAC$  is  $82^\circ$ ,  $\overline{BD}$  is 25.69 cm and  $\angle ABD$  is  $35^\circ$ .



Calculate the length of the front edge of the wing  $\overline{AB}$ .

**Answer:**

$$\begin{aligned}\angle DAB &= \frac{82^\circ}{2} \\ &= 41^\circ\end{aligned}$$

$$\begin{aligned}\angle BDA &= 180^\circ - 35^\circ - 41^\circ \\ &= 104^\circ\end{aligned}$$

← 1 mark for calculation of third angle

$$\frac{b}{\sin B} = \frac{a}{\sin A}$$

← 1 mark for identification of sine law

$$\frac{\text{front edge}}{\sin 104^\circ} = \frac{25.69 \text{ cm}}{\sin 41^\circ}$$

$$\begin{aligned}\text{front edge} &= \frac{25.69 \text{ cm}(\sin 104^\circ)}{\sin 41^\circ} \\ &= 37.99 \text{ cm}\end{aligned}$$

← 1 mark for process/substitution

← 1 mark

**Note to marker:** Accept equivalent solutions.

**Exemplar 1**

(4 marks)

$$\cos 35 = \frac{25.69}{x}$$

$$\frac{\cos 35}{\cos 35} \cdot x = \frac{25.69}{\cos 35}$$

$$x = 31.36 \text{ cm}$$

**Mark: 0 out of 4**

**Rationale:** No calculation of third angle  
Incorrect process/substitution

**Exemplar 2**

(4 marks)

$$\frac{b}{\sin B} = \frac{a}{\sin A}$$

$$\frac{\text{front}}{\sin 63} = \frac{25.69}{\sin 82}$$

$$\frac{25.69 (\sin 63)}{\sin 82}$$

$$\text{front} = 23.11 \text{ cm}$$

**Mark: 3 out of 4**

**Rationale:** Incorrect calculation of third angle  
Correct identification of sine law (1 mark)  
Correct process/substitution (follow-through error) (1 mark)  
Correct final answer (follow-through error) (1 mark)

**Exemplar 3**

(4 marks)

$$\frac{x}{\sin 41} = \frac{25.69}{\sin 104}$$

$$\sin 104 (x) = \frac{\sin 41 (25.69)}{\sin 104}$$

$$x = 17.37 \text{ cm}$$

**Mark: 3 out of 4**

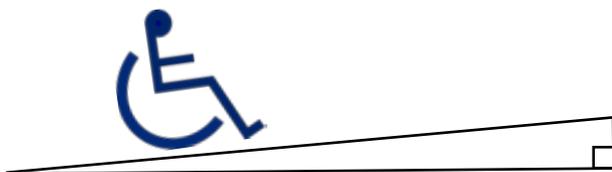
**Rationale:** Correct calculation of third angle (1 mark)  
Correct identification of sine law (1 mark)  
Incorrect process/substitution  
Correct final answer (follow-through error) (1 mark)

**Question 25**

E6.G.2

1 mark

The wheelchair ramp illustrated below forms a triangle.



Identify which of the following terms describes this triangle.

- A) equilateral triangle
- B) isosceles triangle
- C) obtuse triangle
- D) right triangle

**Answer:**     D)

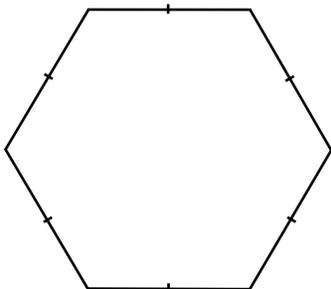


**Question 26**

E6.G.2

2 marks

Given the following regular polygon:



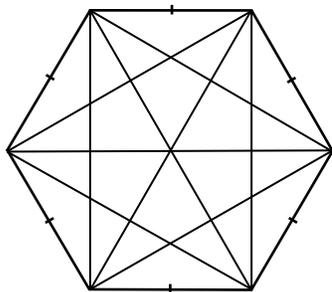
Calculate or illustrate the total number of diagonals that can be drawn.  
If illustrating, clearly state the total number of diagonals.

**Answer:**

$$\begin{aligned} D &= \frac{n(n-3)}{2} \\ &= \frac{6(6-3)}{2} && \leftarrow 1 \text{ mark for process/substitution} \\ &= 9 \text{ diagonals} && \leftarrow 1 \text{ mark} \end{aligned}$$

**OR**

**Answer:**



$\leftarrow$  1 mark for process

= 9 diagonals  $\leftarrow$  1 mark

**Exemplar 1**

(2 marks)

9

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

(2 marks)

$$D = \frac{n(n-3)}{n} \quad D = \frac{18}{6} = \boxed{3}$$

$$D = \frac{6(6-3)}{n}$$

$$D = \frac{6 \times 3}{6}$$

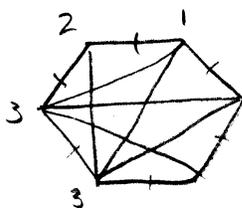
**Mark: 1 out of 2****Rationale:** Incorrect process/substitution  
Correct final answer (follow-through error) (1 mark)**Exemplar 3**

(2 marks)

$$\begin{aligned} \text{Total diagonals} &= \frac{8(8-3)}{2} \\ &= \frac{8(5)}{2} \\ &= 20 \text{ diagonals} \end{aligned}$$

**Mark: 1 out of 2****Rationale:** Incorrect process/substitution  
Correct final answer (follow-through error) (1 mark)**Exemplar 4**

(2 marks)



9

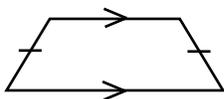
**Mark: 2 out of 2****Rationale:** Correct process (1 mark)  
Correct final answer (1 mark)

Justify why the following statement is false.

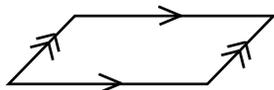
“If a quadrilateral has one pair of parallel sides and one pair of congruent sides, then the quadrilateral must be a parallelogram.”

**Sample Answers:**

- This statement is false. A trapezoid has one pair of parallel sides and one pair of congruent sides but it is not a parallelogram.



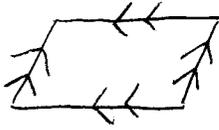
- This statement is false because a parallelogram requires two sets of opposite, parallel, congruent sides.



- This statement is false. For it to be true, one pair of sides of the quadrilateral must be both congruent and parallel.

**Exemplar 1**

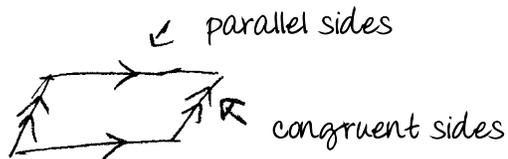
(1 mark)



parallelogram all sides  
are parallel but not all the same  
length

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

(1 mark)



↳ the statement is true

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

**Question 28**

E6.G.2

2 marks

Calculate how many sides a regular polygon has if the sum of the interior angles is  $1980^\circ$ .

**Answer:**

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

$$\left. \begin{array}{l} 1980^\circ = 180^\circ(n - 2) \\ 11 = n - 2 \end{array} \right\} \leftarrow 1 \text{ mark for process/substitution}$$

$$13 = n \quad \leftarrow 1 \text{ mark}$$

**Exemplar 1**

(2 marks)

$$180(n-2)$$

$$180(13-2)$$

$$180(11) \\ = 1980$$

11 sides

**Mark: 1 out of 2****Rationale:** Correct process/substitution (1 mark)  
Incorrect final answer**Exemplar 2**

(2 marks)

$$1980 \div 180 = 11 - 2 = 9$$

**Mark: 1 out of 2****Rationale:** Correct process/substitution (1 mark)  
Incorrect final answer**Exemplar 3**

(2 marks)

$$180(13-2) = 1980$$

13 sides

**Mark: 2 out of 2****Rationale:** Correct process/substitution (1 mark)  
Correct final answer (1 mark)

# Precision Measurement

## Question 29

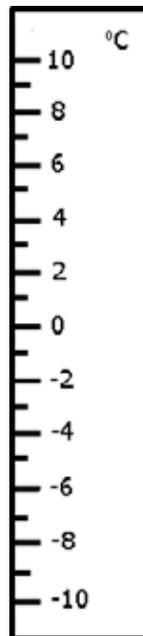
E5.P.1

1 mark

Explain which of the following thermometers is more precise.



Thermometer A



Thermometer B

### Answer:

Thermometer B is more precise because the smallest markings are  $1^{\circ}\text{C}$  while Thermometer A is only precise to  $2^{\circ}\text{C}$ .

**Exemplar 1**

(1 mark)

B is more precise because it has more numbers.

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

(1 mark)

Thermometer B is most precise because it has the closer units of measurement

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

(1 mark)

Thermometer B  
because it goes up by 1  
- 8  
-  
- 10  
the other one  
goes up by 2

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

**Question 30**

E5.P.1

1 mark

Choose the letter that best completes the sentence below.

How close a measurement is to the true value refers to:

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

**Answer:**     B)



**Question 31**

E5.P.1

1 mark

Jordana is having a ring made by a jeweller. Her ring is to weigh 4.86 grams.

Calculate the uncertainty of the weight of her ring.

Do not round your final answer.

**Answer:**

Uncertainty:  $0.01 \div 2$

$= 0.005 \text{ g}$

← 1 mark

**Exemplar 1**

(1 mark)

.86

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

(1 mark)

0.01 grams

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

(1 mark)

$$0.01 / 2 = 0.005$$

$$4.86 \pm 0.005$$

$$4.855, 4.865$$

E1

E5

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

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

E5 (does not include units in final answer)

**Question 32**

E5.P.1

1 mark

Jonalee is a veterinarian. Her thermometer indicated a dog's temperature to be  $38.6^{\circ}\text{C}$ .

State the precision of the thermometer she used.

Do not round your final answer.

**Answer:**

$0.1^{\circ}\text{C}$

**Exemplar 1**

(1 mark)

 $.6^{\circ}C$ **Mark: 0 out of 1****Rationale:** Incorrect answer**Exemplar 2**

(1 mark)

The precision of the thermometer is  
to one tenth of a degree.

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

(1 mark)

$$38.6 = \frac{.1}{2} = 0.05$$

E5  
→ precision

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

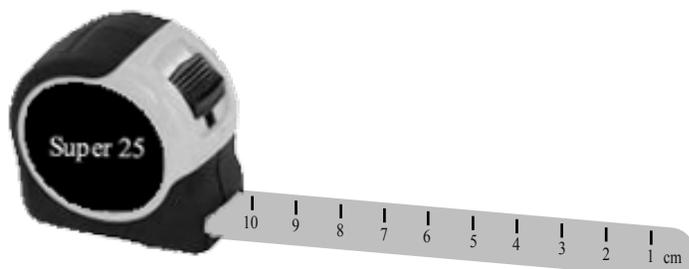
E5 (does not include units in final answer)

**Question 33**

E5.P.1

1 mark

Mario is installing a subfloor using sheets of plywood. He measures a sheet of plywood to be 225 cm long using the tape measure shown below.



Calculate the minimum possible length of the sheet of plywood.

Do not round your final answer.

**Answer:**

Uncertainty: 0.5 cm

Minimum length:  $225 \text{ cm} - 0.5 \text{ cm}$   
 $= 224.5 \text{ cm}$  ← 1 mark

**Exemplar 1**

(1 mark)

224 cm

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

(1 mark)

224.99

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

(1 mark)

224.5 E5

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

E5 (does not include units in final answer)

**Question 34**

E5.P.1

1 mark

Choose the letter that best completes the sentence below.

The tolerance expression that allows for a maximum value greater than 16.5 cm is:

A)  $16.5 \text{ cm} \begin{matrix} +0.5 \text{ cm} \\ 0 \end{matrix}$

B)  $\begin{matrix} 16.5 \text{ cm} \\ 15.5 \text{ cm} \end{matrix}$

C)  $16 \text{ cm} \pm 0.5 \text{ cm}$

D)  $16.5 \text{ cm} \begin{matrix} 0 \\ -1 \text{ cm} \end{matrix}$

**Answer:**     A)



**Question 35**

E5.P.1

1 mark

Oumar is cutting lenses for a pair of glasses. In order for the lenses to fit into the frame, the lenses need to have a minimum thickness of 1.896 mm and a maximum thickness of 2.022 mm.

State the measurement in the form:

maximum value  $\begin{matrix} +0 \\ -\text{tolerance} \end{matrix}$

Do not round your final answer.

**Answer:**

2.022 mm  $\begin{matrix} +0 \\ -0.126 \end{matrix}$

**Exemplar 1**

(1 mark)

$$\begin{array}{r} 2.022 \\ -1.896 \\ \hline T = .126 \end{array}$$

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

(1 mark)

$$2.022$$

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

(1 mark)

$$\begin{array}{l} \text{min} - 1.896 \\ \text{max} - 2.022 \end{array} \left. \vphantom{\begin{array}{l} \text{min} - 1.896 \\ \text{max} - 2.022 \end{array}} \right\} + = 3.918/2 = 1.959$$

$$1.959 - 1.896 = .063$$

$$1.959 - 2.022 = -.063$$

$$1.959 + .063 \quad \begin{array}{|c|} \hline \text{E2} \\ \hline \end{array}$$
$$1.959 - .063 \quad \begin{array}{|c|} \hline \text{E5} \\ \hline \end{array}$$

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

E2 (dimensions written in an alternative form than requested)

E5 (does not include units in final answer)

**Question 36**

E5.P.1

2 marks

An iron needs to be heated to a temperature between 230°F and 280°F.

State the measurement in the form:

$$\text{nominal value} \pm \frac{1}{2}(\text{tolerance})$$

Do not round your final answer.

**Answer:**

$\underbrace{255^\circ\text{F}}$	$\pm$	$\underbrace{25^\circ\text{F}}$
1 mark for nominal value		1 mark for half tolerance

**Exemplar 1**

(2 marks)

$$\begin{aligned} \text{max: } & 280^{+0}_{+50} \\ \text{min: } & 230^{+50}_{-0} \end{aligned}$$

**Mark: 0 out of 2****Rationale:** Incorrect nominal value  
Incorrect half tolerance**Exemplar 2**

(2 marks)

$$255^{+}_{-} .5^{\cdot} f$$

**Mark: 1 out of 2****Rationale:** Correct nominal value (1 mark)  
Incorrect half tolerance

# Statistics

## Question 37

E5.S.2

1 mark

Marc must write an entrance exam to enter university. He must receive a minimum grade of 75% to be accepted.

Last year his mark was in the 70th percentile. He was not accepted. This year his mark is in the 80th percentile.

Justify why it cannot be determined if Marc will be accepted into university this year.

**Answer:**

It cannot be determined if Marc will be accepted this year since his grade on the exam is not indicated.

**Exemplar 1**

(1 mark)

yes he will be accepted because he is in  
the 50th percentile

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

(1 mark)

It depends on the other marks

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

(1 mark)

it is not determined if Marc will  
get accepted because the amount  
of people that scored lower may  
be huge, and his mark didn't  
have to be that great

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

**Question 38**

E5.S.2

2 marks

Financial institutions use credit scores to decide whether people qualify for a loan.

Below is a list of credit scores for people applying for a bank loan.

620	655	706	722	722
768	775	778	780	784
784	800	803	816	824
824	831	840	849	852

Calculate the percentile rank for a credit score of 800.

**Answer:**

$$\left. \begin{aligned} PR &= \frac{b}{n} \times 100 \\ &= \frac{11}{20} \times 100 \\ &= 55 \end{aligned} \right\} \leftarrow 1 \text{ mark for process/substitution}$$

$\therefore 55$  or 55th or  $PR_{55}$   $\leftarrow 1$  mark

**Note to marker:** Follow-through mark is awarded only if the “ $b$ ” or “ $n$ ” is substituted correctly.

**Exemplar 1**

(2 marks)

20 scores

$$\frac{12}{20}$$

60<sup>th</sup> percentile**Mark: 1 out of 2****Rationale:** Incorrect process/substitution

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

**Exemplar 2**

(2 marks)

$$\frac{11}{9} \times 100 = 122^{\text{pr}}$$

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

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

**Exemplar 3**

(2 marks)

$$\frac{11}{20} \times 100 = 55\%$$

55<sup>th</sup> percentile**Mark: 2 out of 2****Rationale:** Correct process/substitution (1 mark)

Correct final answer (1 mark)

**Question 39**

E5.S.1

2 marks

Réjean entered one of his paintings in the provincial art show. The table below shows the points he received and the weight of each category.

Category	Points Received (out of 100)	Weight
Originality	92	35%
Design	87	40%
Colour	77	25%

Calculate the final score on Réjean's painting using a weighted mean.

**Answer:**

$$\left. \begin{array}{l} \text{Final score: } 0.35 \times 92 = 32.20 \\ 0.40 \times 87 = 34.80 \\ \underline{0.25 \times 77 = 19.25} \end{array} \right\} \leftarrow 1 \text{ mark for process}$$
$$86.25 \text{ points} \quad \leftarrow 1 \text{ mark}$$

**Note to marker:** "points" not required

**Exemplar 1**

(2 marks)

$$\begin{array}{l}
 1. 92 \times .35 = 29.44 \\
 2. 87 \times .40 = 34.80 \\
 3. 77 \times .25 = \frac{19.25}{83.49}
 \end{array}$$

**Mark: 1 out of 2**

**Rationale:** Correct process (1 mark)  
Incorrect final answer

**Exemplar 2**

(2 marks)

$$92 \times 35 + 87 \times 40 + 77 \times 25$$

$$\frac{8625}{100} = 86.2 \quad \boxed{\text{E6}}$$

rounded 86 %

**Mark: 2 out of 2**

**Rationale:** Correct process (1 mark)  
Correct final answer (1 mark)  
E6 (does not express the answer to the appropriate number of decimal places)

**Exemplar 3**

(2 marks)

$$\begin{array}{l}
 92 \times .35 = 32.2 \\
 87 \times .40 = 34.8 \\
 77 \times .25 = 19.3
 \end{array}$$

$\boxed{\text{E6}}$

$$\begin{array}{r}
 32.2 \\
 34.8 \\
 19.3 \\
 \hline
 86.3\%
 \end{array}$$

**Mark: 2 out of 2**

**Rationale:** Correct process (1 mark)  
E6 (rounds too soon)  
Correct final answer (follow-through error) (1 mark)

**Question 40**

E5.S.1

1 mark

A store sells shoes with sizes ranging from 7 to 12. The following table shows sales for the last month.

Size	Quantity Sold
7	5
8	20
9	25
10	43
11	5
12	2

Choose the letter that best completes the sentence below.

The measure of central tendency that represents the most popular shoe size is:

- A) mean
- B) median
- C) mode
- D) weighted mean

Answer:     C)



**Question 41**

E5.S.1

2 marks

Environment Canada recorded the following maximum daily temperatures for Thompson for one week in October 2016.

**Maximum Daily Temperature**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1.70°C	3.40°C	-5.90°C	0.10°C	1.80°C	7.10°C	2.60°C

A) Calculate the mean temperature for the week. (1 mark)

**Answer:**

$$\begin{aligned}\text{Mean: } & \frac{10.8^\circ\text{C}}{7} \\ & = 1.54^\circ\text{C} \quad \leftarrow 1 \text{ mark}\end{aligned}$$

B) Calculate the trimmed mean temperature for the same week by removing the highest and lowest temperatures. (1 mark)

**Answer:**

$$\begin{aligned}\text{Trimmed mean: } & \frac{9.6^\circ\text{C}}{5} \\ & = 1.92^\circ\text{C} \quad \leftarrow 1 \text{ mark}\end{aligned}$$

**Exemplar 1**

(2 marks)

$$A) \frac{1.7 + 3.4 + -5.9 + 0.1 + 1.8 + 7.1 + 2.6}{7} \\ = 0.77^{\circ}\text{C}$$

$$B) \frac{1.7 + 3.4 + 0.1 + 1.8 + 2.6}{5} \\ = 9.6$$

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

Incorrect answer in Part B

**Exemplar 2**

(2 mark)

$$A) \bar{x} = \frac{-5 + 0.1 + 1.7 + 1.8 + 2.6 + 3.4 + 7.1}{7} \\ \frac{11.7}{7} \\ \bar{x} = \underline{1.67} \text{ or } 1.7^{\circ}\text{C}$$

$$B) \frac{0.1 + 1.7 + 1.8 + 2.6 + 3.4}{5} \\ \frac{9.6}{5} \\ \underline{1.92^{\circ}\text{C}}$$

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

E3 (makes a transcription error)

Correct answer in Part B (1 mark)

**Exemplar 3**

(2 marks)

A)  $1.5^{\circ}\text{C}$  E6

B)  $1.92^{\circ}\text{C}$

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

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

Correct answer in Part B (1 mark)



**Question 42**

E5.S.1

2 marks

Sidi works as a sales clerk at Cycle Sports. During the first 12 days of the month, the store sold the following numbers of bikes:

16	32	27	19
19	23	19	32
25	20	35	33

Calculate the median and the mode of this data.

Median: \_\_\_\_\_ bikes

Mode: \_\_\_\_\_ bikes

**Answer:**

Median:   24   bikes    ← 1 mark

Mode:   19   bikes    ← 1 mark

**Exemplar 1**

(2 marks)

Median: 23, 25 bikesMode: 19, 32 bikes16, 19, 19, 19, 20, 23, 25, 27, 32, 32,  
33, 35**Mark: 0 out of 2****Rationale:** Incorrect median  
Incorrect mode





# **Appendices**



## Appendix A: Table of Questions by Unit and Learning Outcome

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

<b>Geometry and Trigonometry</b>		
<b>Question</b>	<b>Learning Outcome</b>	<b>Mark</b>
22	E6.G.1	3
23	E6.G.1	1
24	E6.G.1	4
25	E6.G.2	1
26	E6.G.2	2
27	E6.G.2	1
28	E6.G.2	2
		<b>Total = 14</b>
<b>Precision Measurement</b>		
<b>Question</b>	<b>Learning Outcome</b>	<b>Mark</b>
29	E5.P.1	1
30	E5.P.1	1
31	E5.P.1	1
32	E5.P.1	1
33	E5.P.1	1
34	E5.P.1	1
35	E5.P.1	1
36	E5.P.1	2
		<b>Total = 9</b>
<b>Statistics</b>		
<b>Question</b>	<b>Learning Outcome</b>	<b>Mark</b>
37	E5.S.2	1
38	E5.S.2	2
39	E5.S.1	2
40	E5.S.1	1
41 a)	E5.S.1	1
41 b)	E5.S.1	1
42	E5.S.1	2
		<b>Total = 10</b>

# 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.:** \_\_\_\_\_

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**Problem(s) noted:** \_\_\_\_\_

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**Question(s) affected:** \_\_\_\_\_

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**Action taken or rationale for assigning marks:** \_\_\_\_\_

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**Follow-up:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Decision:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Marker's Signature:** \_\_\_\_\_

**Principal's Signature:** \_\_\_\_\_

<p><b>For Department Use Only—After Marking Complete</b></p> <p><b>Consultant:</b> _____</p> <p><b>Date:</b> _____</p>
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# 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)
- incorrect application of percent symbol

#### 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)

