Grade 12
Essential Mathematics
Achievement Test

Marking Guide

June 2025

Manitoba

Grade 12 Essential Mathematics Achievement Test:
Marking Guide (June 2025)

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This resource will be available on the Manitoba Education and Early Childhood Learning website at www.edu.gov.mb.ca/k12/assess/archives/index.html.

Websites are subject to change without notice.

Disponible en français.

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.

Contents

General Marking Instructions

The *Grade 12 Essential Mathematics Achievement Test: Marking Guide (June 2025)* 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 Early Childhood Learning 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.

Each time a student makes one of the following errors, a 0.5 mark deduction will apply:

- arithmetic error
- procedural error
- terminology error in explanation
- lack of clarity in written responses

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 the *Marking Guide* for details.

Noircir les cercles ci-dessous pour une déduction maximale totale de 3 points (déduction de 0,5 point par type d'erreur). Consulter le *Guide de Correction* pour plus de details.

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

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 simply the 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 Early Childhood Learning 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.

Sara MacPherson
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Grade 12 Essential Mathematics
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Probability

Question 1 E6.P.1 1 mark

A survey was conducted in a local high school. The survey found that 80% of the students play sports.

State the odds in favour of a student playing sports.

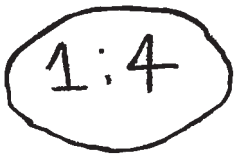
Answer:

80 : 20 or 4 : 1

Note to marker: Accept equivalent representations.

Exemplar 1

1 mark



Mark: 0 out of 1

Exemplar 2

1 mark

$80 \div 2 = 40$

Mark: 0 out of 1

Exemplar 3

1 mark

80:20

4:2

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for arithmetic error

Exemplar 4

1 mark

8:2

Mark: 1 out of 1

Rationale: Award full marks (equivalent representation)

Question 2 E6.P.1 1 mark

Amy takes a loonie from her pocket and tosses it ten times. Each time it lands with the head facing up.

Explain whether Amy should use theoretical probability or experimental probability to predict the outcome of the next throw.

Sample Answer:

Theoretical probability because the previous tosses do not affect the outcome of the next toss.

Exemplar 1

1 mark

Experemental because theoretically the coin should have landed on heads 5 and tails 5 but it was heads 10 so experemental would be more accurate.

Mark: 0 out of 1

Exemplar 2

1 mark

Amy should use theoretical probability because of the outcome wanted vs. outcome against.

Mark: 0 out of 1

Exemplar 3

1 mark

Amy should use theoretical probability because in this instance it would be more accurate.

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (accurate how?)

Exemplar 4

1 mark

theoretical because she already knows it has high hopes of landing heads up again

Mark: 0 out of 1

Question 3 E6.P.1 2 marks

The t-shirts sold at Springfield High's school store come in three sizes: small, medium, and large.

Last year, the store sold 76 small t-shirts, 109 medium t-shirts, and 56 large t-shirts.

A) Calculate the experimental probability that a medium t-shirt was sold last year. (1 mark)

Answer:

Total number of t-shirts $= 76 + 109 + 56$
$= 241$

Probability $= \frac{109}{241}$ or 0.45 or 45.23% ← 1 mark

B) Calculate how many medium t-shirts should be ordered if 150 are expected to be sold this year based on last year's sales. (1 mark)

Answer:

$\frac{109}{241} \times 150$

$= 67$ or 68 medium t-shirts ← 1 mark

Exemplar 1

2 marks

A) There is a 1 out of 3 chance

B) $150 \div 3 = 50$

50 medium-sized t-shirts should be ordered

Mark: 1 out of 2

Rationale: Incorrect answer in Part A
Award full marks in Part B (follow-through error)

Exemplar 2

2 marks

A) $76+109+56$

$\frac{109}{241}$

B) $\frac{109}{241} = \frac{x}{150}$

$x = 28.13$ medium t-shirts

Mark: 1.5 out of 2

Rationale: Award full marks
0.5 mark deduction for arithmetic error in Part B

Exemplar 3

2 marks

A)

B) $76+109+56=241$

$\frac{109}{241} \times 100 = 45.23\%$

$150 \times 0.4523 = 67.85$ tshirts

Mark: 2 out of 2

Rationale: Award full marks
E1 (answer presented in another part of question) in Part A
E4 (whole units)

Question 4 E6.P.1 3 marks

The Retro Record company has been installing sound systems for decades. The company is bidding on a $350 000 contract. The probability of winning the contract is 4%. It costs the company $8975 to prepare the bid.

A) Calculate the expected value of the contract. (2 marks)

Show your work.

Answer:

$EV = (0.04)(341\ 025) + (0.96)(-8975)$ ← 0.5 mark for calculating gain; ← 0.5 mark for probability of loss

$= 13\ 641 + (-8616)$ ← 1 mark for addition

$= \$5025$

OR

Answer:

Potential earnings $= (0.04)(350\ 000)$ ← 1 mark for multiplication

$= \$14\ 000$

Expected value $= 14\ 000 - 8975$ ← 1 mark for subtraction

$= \$5025$

B) Justify if they should bid on this contract, based on your answer in Part A. (1 mark)

Answer:

Yes, the expected value is positive so the company could expect to gain money over time.

Exemplar 1

3 marks

A) $350,000 × 0.4) − $8975

$131,025

B) Yes

Mark: 1.5 out of 3

Rationale: Award full marks in Part A
0.5 mark deduction for procedural error (divided by 10) in Part A
Incorrect answer in Part B (no justification)

Exemplar 2

3 marks

A) (350 000)(.04) − 8975 = 5,025

B) Yes they should bid because the EV is positive.

Mark: 3 out of 3

Rationale: Award full marks
E5 (units not included in final answer) in Part A

Exemplar 3

3 marks

A) 341025
$0.04 \times (350000 - 8975) - 0.96 \times 8975$

$= \$5025$

B) Yes the should because they are expected to win.

Mark: 2 out of 3

Rationale: Award full marks in Part A
Incorrect answer in Part B

Question 5 E6.P.1 1 mark

The odds of having red hair are 2:99.

A student calculated the probability of having red hair as follows:

$$\frac{2}{99} = 0.0202...$$

Describe the student's error.

Answer:

The student did not add the odds in favour and odds against together to find the total value for the denominator.

Exemplar 1

1 mark

Didn't round to 2 decimal places.

Mark: 0 out of 1

Exemplar 2

1 mark

The denominator is wrong.

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (wrong how?)

Exemplar 3

1 mark

$$\frac{2}{101}$$

Mark: 1 out of 1

Question 6 E6.P.1 2 marks

Sheldon is playing a dart game. He throws a dart at a board and wins a prize if the dart hits an odd number. Sheldon is allowed one throw. He has the option of aiming at either Board A or Board B.

Board A

12	15	9	8
7	14	6	10
13	1	17	4
5	11	19	3

Board B

91	88	82
87	83	81
99	85	90

Justify, using probability, which board Sheldon should aim at, assuming his dart hits the board.

Show your work.

Answer:

Board A

$P(\text{odd}) = \frac{10}{16}$

$= 0.625$

Board B

$P(\text{odd}) = \frac{6}{9}$

$= 0.667$

← 0.5 mark for probability of Board A

← 0.5 mark for probability of Board B

Sheldon should aim at Board B because there is a greater probability of the dart hitting an odd number.

← 1 mark for justification

Note to marker: Accept equivalent representations for probabilities.

Exemplar 1

2 marks

Board A

12	15	9	8
7	14	6	10
13	1	17	4
5	11	19	3

Board B

91	88	82
87	83	81
99	85	90

Board A =

10/16

= 62.5%

Board B =

6/9

= 66.67%

Mark: 1 out of 2

Rationale: 1 mark for probability of Board A and B

Exemplar 2

2 marks

$\frac{16}{9} = 9:16$

He should trow the dart on board b because there's a highposibility that he's going to get 99 or 83.

Mark: 0 out of 2

Exemplar 3

2 marks

Board A

$\frac{10}{16} = \frac{5}{8}$

B

$\frac{7}{9}$

Sheldon should aim at board B because there is a higer probability of hitting an odd number.

Mark: 1.5 out of 2

Rationale: 0.5 mark for probability of Board A
1 mark for justification

Exemplar 4

2 marks

Board A

$= \frac{10}{16}$

$= 0.625$ or 63%.

Board B

$= \frac{6}{9}$

$= 0.67$ or 67%.

Sheldon should use Board B because the board has lesser values and lesser even numbers which increases his chances of winning compared to Board A that has more values and more even numbers.

Mark: 1.5 out of 2

Rationale: Award full marks
0.5 mark deduction for lack of clarity (no reference to probability)

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Vehicle Finance

Question 7 E5.V.1 2.5 marks

Martin took his classic car out for a drive.

A) At the start of the trip, the odometer read 021769.1 km. At the end, the odometer read 022329.7 km. Martin's car used 90 L of gas on this trip.

Calculate the car's fuel economy in L/100 km. (1.5 marks)

Show your work.

Answer:

Distance travelled $= 022329.7 - 021769.1$

$= 560.6$ km ← 0.5 mark for distance travelled

$$\frac{FE}{100} = \frac{90\text{ L}}{560.6\text{ km}}$$

$$FE = \frac{90}{560.6} \times 100$$ ← 1 mark for calculating fuel economy

$= 16.05422...$

$= 16.05$ L/100 km

B) The cost of gas is \$1.629 per litre.

Calculate the cost of gas used for this trip. (1 mark)

Answer:

90×1.629

$= \$146.61$ ← 1 mark for cost of gas

Exemplar 1

2.5 marks

A) 22329.7
21769.1
560.6

$\frac{90}{560.6} = 16.0$

B) $90 \times 1.629 = 146.61$

Mark: 2.5 out of 2.5

Rationale: Award full marks
E2 (inappropriate use of equal sign) in Part A
E5 (missing units) in Parts A and B
E6 (rounding) in Part A

Exemplar 2

2.5 marks

A) $\frac{90}{560.6} = .16054 \times 100$

16.05 / 100km

Mark: 1.5 out of 2.5

Rationale: Award full marks in Part A
No response in Part B
E2 (inappropriate use of equal sign) in Part A
E5 (missing units) in Part A

Exemplar 3

2.5 marks

A) $Fe = \frac{\text{gas used}}{Km} \times 100$

$\frac{560.6}{90} \times 100$

$= 622.88$

B) $\frac{Fe}{100} \times Km$

$\frac{560.6}{100} \times 1.629$

$= \$91.32$

Mark: 0.5 out of 2.5

Rationale: 0.5 mark for distance travelled
Incorrect answer in Part B

Question 8 E5.V.1 1 mark

Choose the letter that best completes the statement below.

Identify a factor that will affect the cost of vehicle insurance premiums.

A) the age of the driver

B) the make and model of the vehicle

C) the gender of the driver

D) the vehicle mileage

Answer: B

Question 9 E5.V.1 2 marks

Orla would like to purchase a used vehicle privately. The price of the vehicle is $7500 and the book value is $7000. Orla pays $23.50 for a lien search.

Calculate the total amount Orla will pay for the vehicle, plus taxes.

Show your work.

Answer:

$$\begin{aligned} \text{Tax on vehicle} &= 7500 \times 0.07 \\ &= \$525 \end{aligned}$$

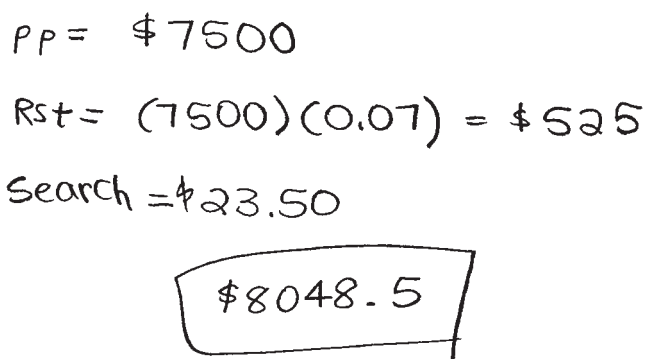
← 1 mark for calculating RST on vehicle price

$$\begin{aligned} \text{Total amount} &= 7500 + 525 + 23.50 \\ &= 8025 + 23.50 \\ &= \$8048.50 \end{aligned}$$

← 1 mark for addition using $7500

Exemplar 1

2 marks



Mark: 2 out of 2

Rationale: Award full marks
E6 (rounding: money requires two decimals) in Part B

Exemplar 2

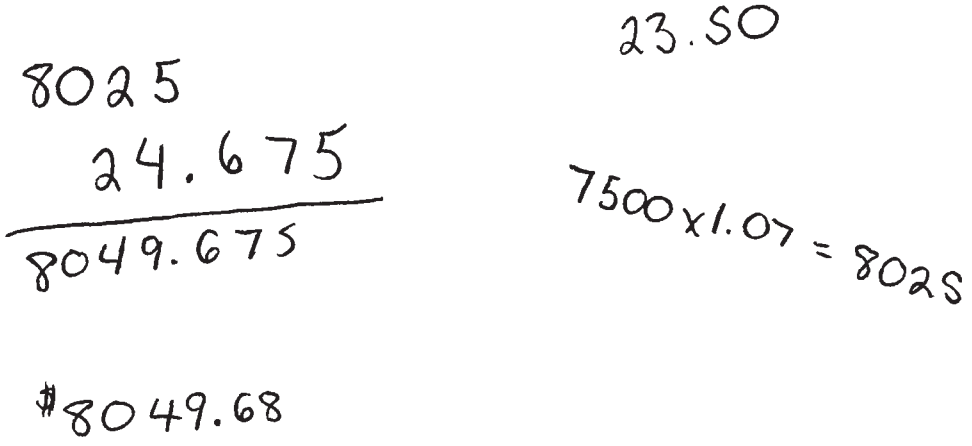
2 marks

Mark: 1 out of 2

Rationale: 1 mark for addition using $7500

Exemplar 3

2 marks



Mark: 1 out of 2

Rationale: Award full marks
1 mark deduction for concept error (taxes on lien)

Question 10 E5.V.1 2.5 marks

Karlita purchases a vehicle from a dealership for $28 500. The vehicle loses $4275 in value during the first year.

A) Calculate the vehicle's depreciation rate during the first year, as a percent. (1 mark)

Answer:

$$\text{Depreciation rate} = \frac{4275}{28\,500} \times 100$$

$$= 15\% \qquad \leftarrow 1 \text{ mark}$$

B) The vehicle's depreciation rate in the second year is 10%.

Calculate the value of the vehicle at the end of Year 2. (1.5 marks)

Show your work.

Answer:

$$\text{Year 1} = 28\,500 - 4275$$

$$= \$24\,225 \qquad \leftarrow 0.5 \text{ mark for value of vehicle at the end of year 1}$$

$$\text{Amount of depreciation} = 24\,225 \times 0.10$$

$$= \$2422.50 \qquad \leftarrow 0.5 \text{ mark for depreciation in year 2}$$

$$\text{Year 2} = 24\,225 - 2422.50$$

$$= \$21\,802.50 \qquad \leftarrow 0.5 \text{ mark for value of vehicle at the end of year 2}$$

OR

Answer:

$$\text{Year 1} = 28\,500 - 4275$$

$$= \$24\,225 \qquad \leftarrow 0.5 \text{ mark for value of vehicle at the end of year 1}$$

$$\text{Year 2} = 24\,225 \times 0.90$$

$$= \$21\,802.50 \qquad \leftarrow 1 \text{ mark for value of vehicle at the end of year 2}$$

Exemplar 1

2.5 marks

A) 28,500 - 4275

=$24,225 # 24225/28500 =.85

15% depreciation value

B) 24225 x .10 = 2422.5

24225 - 2422.5

=21,802.5 at the end of year 2

Mark: 2.5 out of 2.5

Rationale: Award full marks (alternate solution)
E5 (missing units) in Part B
E6 (rounding: money requires two decimals) in Part B

Exemplar 2

2.5 marks

A) 28500 x 0.15 = 4275

B) 28500 - 4275 = 24225

24225 x 0.90 = 21802.50

Mark: 2.5 out of 2.5

Rationale: Award full marks
E1 (final answer not stated) in Part A
E5 (missing units) in Part B

Exemplar 3

2.5 marks

A) 15%

B) 28,500 - 4275 = 24225

24225 x 0.10 = $2422.50

Mark: 2 out of 2.5

Rationale: Award full marks in Part A
0.5 mark for value of vehicle at the end of year 1
0.5 mark for depreciation in year 2

Exemplar 4

2.5 marks

A) 4275/28500 = 0.15

0.15 x 100 = 15%

B) 28500 x 0.10 = 2850

28500
2850
25650

$25,650

Mark: 2 out of 2.5

Rationale: Award full marks in Part A
0.5 mark for depreciation in year 2 (follow-through error)
0.5 mark for value of vehicle at the end of year 2 (follow-through error)

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Question 11 E5.V.1 1 mark

Describe one reason why pleasure insurance is less expensive than all-purpose insurance.

Sample Answers:

- You can only drive to work or school four times a month which reduces the chances of making a claim.
- You are less likely to be driving at peak times, therefore reducing the chances of being in an accident.

Exemplar 1

1 mark

Because pleasure cars are only allowed a very little amount of time on the road in comparison to a all-purpose which is used constantly.

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (no reference to claim)

Exemplar 2

1 mark

NOT AS LIKELY TO BE ON THE ROAD AS MUCH.

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (no reference to claim)

Exemplar 3

1 mark

because you're less likely to get into an accident

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (why less likely?)

Question 12 E5.V.1 3 marks

Katie takes her vehicle to a garage for maintenance work. Her vehicle needs a fuel pump for $134 and a new air filter for $75. There is a fee of $12 for additional materials. The garage charges $129 per hour for labour. The work takes 3 hours and 45 minutes to complete.

Calculate the total amount Katie will pay, plus taxes.

Show your work.

Answer:

$$\text{Cost of materials} = 134 + 75 + 12 \quad \leftarrow \text{0.5 mark for addition}$$
$$= \$221$$

$$\text{Labour cost} = 129 \times 3.75 \quad \leftarrow \text{0.5 mark for hours worked}$$
$$= \$483.75 \quad \leftarrow \text{0.5 mark for multiplication}$$

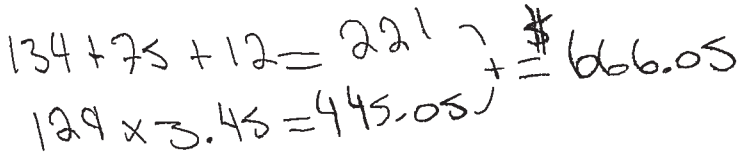
$$\text{Total cost before taxes} = 221 + 483.75$$
$$= \$704.75 \quad \leftarrow \text{0.5 mark for subtotal}$$

$$\text{Total cost after taxes} = 704.75 + (704.75 \times 0.05) + (704.75 \times 0.07)$$
$$= 704.75 + 35.24 + 49.33$$
$$= \$789.32$$

← 1 mark for calculating total cost plus taxes

Exemplar 1

3 marks

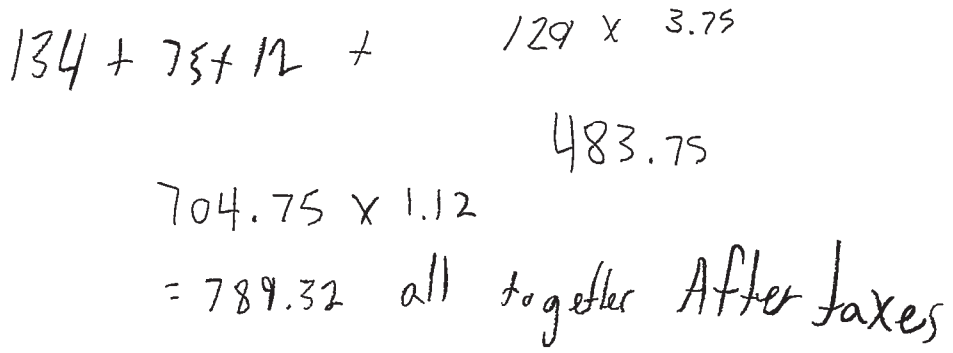


Mark: 1.5 out of 3

Rationale: 0.5 mark for addition
0.5 mark for multiplication
0.5 mark for subtotal (follow-through error)

Exemplar 2

3 marks

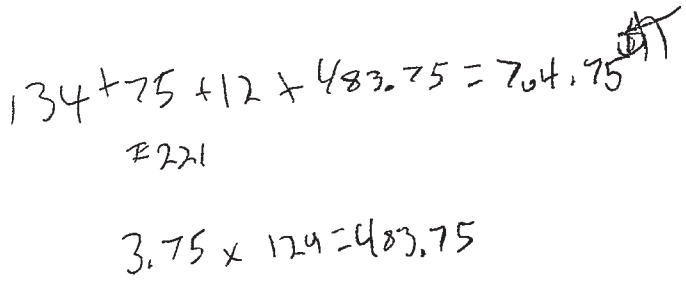


Mark: 3 out of 3

Rationale: Award full marks
E5 (missing units)

Exemplar 3

3 marks



Mark: 2 out of 3

Rationale: 0.5 mark for addition
0.5 mark for hours worked
0.5 mark for multiplication
0.5 mark for subtotal

Question 13 E5.V.1 2 marks

Lorenzo wants to lease a truck. The dealership offers a three-year lease where Lorenzo would pay $450 a month, taxes included. A down payment of $3000 is required.

Calculate Lorenzo's total leasing costs.

Show your work.

Answer:

$(450 \times 3 \times 12) + 3000$ ← 1 mark for multiplication
← 1 mark for addition

$= \$19\,200$

OR

Answer:

$450 \times 3 \times 12$ ← 1 mark for multiplication

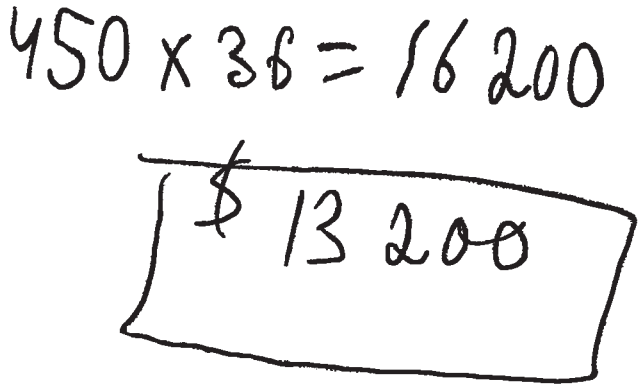
$= \$16\,200$

$16\,200 + 3000$ ← 1 mark for addition

$= \$19\,200$

Exemplar 1

2 marks



Mark: 1 out of 2

Rationale: 1 mark for multiplicaton

Exemplar 2

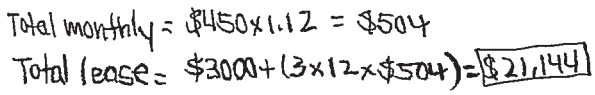
2 marks

Mark: 1 out of 2

Rationale: 1 mark for multiplicaton
E5 (missing units)

Exemplar 3

2 marks



Mark: 1.5 out of 2

Rationale: Award full marks
0.5 mark deduction for procedural error (including taxes)

Question 14 E5.V.1 1 mark

Your friend wants to purchase a used vehicle and finds two identical vehicles priced similarly. One vehicle is at a dealership while the other is a private sale.

Justify which vehicle your friend should purchase.

Sample Answers:

Dealership

- may have slightly longer warranty
- vehicle report (Carfax) more readily available
- safety and lien search already complete

Private sale

- no GST on price

Exemplar 1

1 mark

dealership is a better option
Because they are more trust
worthy

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (why is the dealership more trustworthy?)

Exemplar 2

1 mark

She should buy privately so there is less taxes to pay.

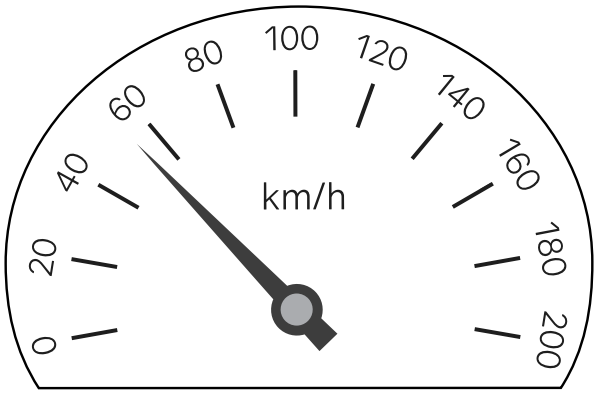
Mark: 1 out of 1

Precision Measurement

Note: Do not round answers in this unit.

Question 15 E5.P.1 2 marks

The speedometer of a car is shown below.



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

Answer:

20 km/h

B) Determine the uncertainty of the speedometer. (1 mark)

Answer:

Uncertainty $= 20 \div 2$

$= \pm 10$ km/h

Note to marker: $\pm$ is not required.

Exemplar 1

2 marks

A) 0,1 km

B) 0,09 km

Mark: 1 out of 2

Rationale: Incorrect answer in Part A
Award full marks (follow-through error) in Part B
E5 (incorrect units of measure) in Part B

Exemplar 2

2 marks

A) 10 km/h

B) 0,11 km/h

Mark: 0 out of 2

Question 16 E5.P.1 2 marks

The pH for water in a fish tank must be between 7.1 and 8.1. The nominal pH is the midpoint between these two measures.

State the pH for the water in the form:

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

Answer:

$$\text{Nominal value} = \frac{7.1 + 8.1}{2}$$

$$= 7.6$$

$$\text{Half tolerance} = \frac{8.1 - 7.1}{2}$$

$$= 0.5$$

$\text{pH} = 7.6 \pm 0.5$

← 1 mark for nominal value
← 1 mark for half tolerance in the correct form

Exemplar 1

2 marks

$7.1^{\pm 0.5} = 7.6$

$7.1^{\pm 0.5} = 6.6$

$8.1^{\pm 0.5} = 8.6$

$8.1^{\pm 0.5} = 7.6$

the PH midPoint is 7.6

Mark: 1 out of 2

Rationale: 1 mark for nominal value

Exemplar 2

2 marks

$\frac{7.1 + 8.1}{2} = 7.6$

$8.1 - 7.1 = 1$

$7.6 \pm \frac{1}{2}(1)$

Mark: 2 out of 2

Exemplar 3

2 marks

Nomial $= \frac{7.1 + 8.1}{2}$

$= 7.6$

½ to 1 = ½

$= 0.5$

Mark: 1 out of 2

Rationale: 1 mark for nominal value

Question 17 E5.P.1 3 marks

Imam weighs two bags of coffee with the same scale. The mass of the first bag is 1.9 kg and the mass of the second bag is 1.2 kg.

A) Determine the uncertainty of the scale. (1 mark)

Answer:

$$\begin{aligned} \text{Precision} &= 0.1 \text{ kg} \\ \text{Uncertainty} &= 0.1 \div 2 \\ &= \pm 0.05 \text{ kg} \end{aligned}$$

← 1 mark for uncertainty

Note to marker: $\pm$ is not required.

B) Determine the maximum possible mass of the two bags of coffee when combined. (2 marks)

Show your work.

Answer:

$$\left.\begin{aligned} \text{Maximum mass of Bag 1} &= 1.9 + 0.05 \\ &= 1.95 \text{ kg} \\ \text{Maximum mass of Bag 2} &= 1.2 + 0.05 \\ &= 1.25 \text{ kg} \end{aligned}\right\} \leftarrow \text{1 mark for addition of uncertainties}$$

$$\begin{aligned} \text{Maximum total mass} &= 1.95 + 1.25 \\ &= 3.20 \text{ kg} \end{aligned}$$

← 1 mark for calculating maximum total mass

Exemplar 1

3 marks

A) Precision = 0.1kg

Uncertainty = ½ (precision)

= ±0.05kg

B) Total mass = mass A ± uncertainty + mass B ± uncertainty

= 1.9kg ± 0.05kg + 1.2kg ± 0.05kg

≠3.1kg ± 0.10kg

Mark: 2 out of 3

Rationale: 1 mark for uncertainty in Part A
1 mark for addition of uncertainties in Part B

Exemplar 2

3 marks

A) 0.05

B) Bag A
1.9 kg
↳ 1.9 ± 0.05
= 1.95 to 1.85

Bag B
1.2 kg
↳ 1.2 ± 0.05
= 1.25 to 1.15

Max : 1.95 + 1.25
= 3.2 kg

Mark: 3 out of 3

Rationale: Award full marks
E5 (missing units) in Part A

Exemplar 3

3 marks

A) uncertainty = 1/2 of percision

$0.1 \times 0.5 =$ **0.05 kg**

B) $1.9 + 1.2 = 3.1$

$3.1 + 0.05 =$ **3.15 kg**

Mark: 2 out of 3

Rationale: 1 mark for uncertainty in Part A
1 mark for calculating maximum total mass in Part B

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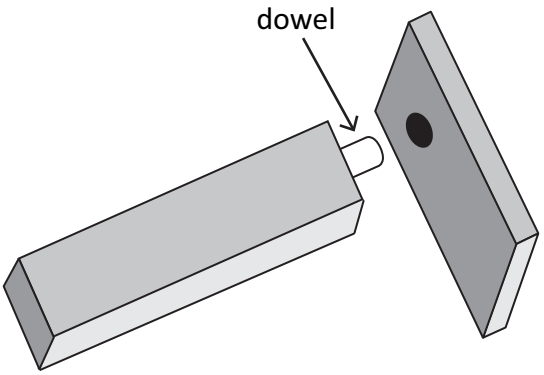
Question 18 E5.P.1 3 marks

Marley is building a bookshelf. One of the wooden pieces has a dowel that must fit into a hole in another piece of wood.

The nominal diameter, which is the midpoint between the maximum and minimum diameters, is 2.2 cm with a tolerance of 0.05 cm.



A) State the maximum and minimum diameter of the dowel. (2 marks)

Answer:

Maximum: 2.225 cm ← 1 mark for maximum value

Minimum: 2.175 cm ← 1 mark for minimum value

B) Explain one reason why tolerance is important when considering the diameter of the dowel. (1 mark)

Sample Answers:

- If the dowel is too big, it will not fit in the hole.
- If the dowel is too small, it will be loose and the joint will not be strong.

Exemplar 1

3 marks

A) Maximum: 2.25 cm

Minimum: 2.15 cm

B) The tolerance helps when finding the diameter as it provides a baseline amount to find the measurement

Mark: 1 out of 3

Rationale: 1 mark for minimum value (follow-through error) in Part A
Incorrect answer in Part B

Exemplar 2

3 marks

A) Maximum: 2.205

Minimum: 2.195

B) If it's too big it won't fit.

Mark: 2 out of 3

Rationale: 1 mark for minimum value (follow-through error) in Part A
Award full marks in Part B
E5 (missing units) in Part A

Question 19 E5.P.1 3 marks

A) State the measurement 7.25 cm $\pm$ 0.03 cm in the form: minimum $^{+\text{tolerance}}_{-0}$.
(2 marks)

Answer:

Minimum $= 7.25 - 0.03$

$= 7.22$

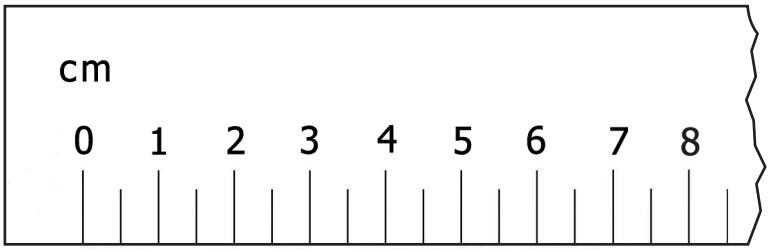
Tolerance $= 0.03 \times 2$

$= 0.06$

$= 7.22 \text{ cm } ^{+0.06 \text{ cm}}_{-0}$

← 1 mark for minimum
← 1 mark for tolerance in the correct form

B) Explain whether the ruler shown below can be used to find the measurement in Part A.
(1 mark)



Sample Answers:

- No, since the ruler is not precise enough to measure hundredths of a centimetre.
- No, since the precision of the ruler is 0.5 cm, not 0.01 cm.

Exemplar 1

3 marks

A) 7.25 ± 0.03

$\downarrow$

$7.22^{+0.06\text{cm}}_{-0}$

B) The uncertainty of this ruler is 0.25cm, So yes you can use it.

Mark: 2 out of 3

Rationale: Award full marks in Part A
Incorrect answer in Part B
E5 (missing units) in Part A

Exemplar 2

3 marks

A) $7.25 - 0.03 = 7.22$

$7.22^{+0.03}_{-0}$

B) No because the ruler has a precision of 0.5, and the measurement in part a has a smaller decimal place.

Mark: 2 out of 3

Rationale: 1 mark for minimum value in Part A
Award full marks in Part B
E5 (missing units) in Part A

Statistics

Question 20 E5.S.1 1 mark

Choose the letter that best completes the statement below.

Identify the measure of central tendency that is most affected by outliers.

A) the mean

B) the median

C) the mode

D) the trimmed mean

Answer: A

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Question 21 E5.S.1 3 marks

The average monthly overnight temperatures for Winnipeg are given in the table below.

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average Overnight Temp. (°C)	−22	−19	−11	−2	4	11	14	12	6	0	−11	−18

A) Calculate the mean annual overnight temperature for Winnipeg. (2 marks)

Show your work.

Answer:

$$\text{Mean} = \frac{(-22-19-11-2+4+11+14+12+6+0-11-18)}{12} \quad \leftarrow \text{1 mark for addition}$$

$$= \frac{-36}{12} \quad \leftarrow \text{1 mark for division}$$

$$= -3°\text{C}$$

B) The median temperature is −1°C.

Justify whether the mean or median would be a better measure to use if Tourism Manitoba wants data to attract visitors to Winnipeg. (1 mark)

Sample Answers:

- Median temperature: a higher temperature will attract more visitors.
- Mean temperature: people prefer colder weather for winter activities.

Exemplar 1

3 marks

A) $\frac{-36}{12} = -3$

B) I think mean because I think using that is more accurate

Mark: 2 out of 3

Rationale: Award full marks in Part A
Incorrect answer in Part B
E5 (missing units) in Part A

Exemplar 2

3 marks

A) $-22, -19, -18, -11, -11, -2, 0, 4, 6, 11, 12, 14$

$\frac{130}{12}$

B) Mean because it is good

Mark: 0 out of 3

Exemplar 3

3 marks

A) $-22+-19+-11+-2+4+11+19+12+6+0+-11+-18$

$\frac{-50}{12}$ $-4.16°C$

B) the median becaus the mean is greatly affected by the outliers.

Mark: 1 out of 3

Rationale: 1 mark for division in Part A (follow-through error)
Incorrect answer in Part B
E6 (rounding) in Part A

Exemplar 4

3 marks

A) $-3°C$

B) median because it shows warmer than the $-3°C$

Mark: 1.5 out of 3

Rationale: Maximum 1 mark awarded for correct answer because work was not shown in Part A
0.5 mark deduction for lack of clarity in Part B (why is warmer important?)

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Question 22 E5.S.2 1 mark

In a school division, 120 students wrote a math exam. There were 47 students who scored higher than Adam.

A student calculated Adam's percentile rank as follows:

$$PR = \frac{73}{120} \times 100$$

$$= 61\text{st}$$

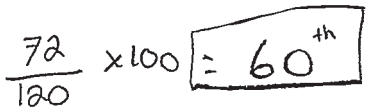
Describe the student's error.

Sample Answers:

- The student did not subtract Adam from the total number below him.
- There were only 72 students who scored below Adam.

Exemplar 1

1 mark



Mark: 1 out of 1

Exemplar 2

1 mark

They should have subtracted Adam

Mark: 1 out of 1

Exemplar 3

1 mark

they subtracted the wrong number of students

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (wrong number how?)

Exemplar 4

1 mark

the wrong number of students was used

Mark: 0 out of 1

Exemplar 5

1 mark

they forgot Adam

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (forgot how?)

Question 23 E5.S.1 2 marks

Clarinda is taking a carpentry course at a community college. Her final mark is calculated according to the categories shown below.

Course Activity	Clarinda's Mark (Out of 100)	Weight
Projects	75	50%
Tests	80	40%
Final Exam	65	10%

Calculate Clarinda's final mark by using a weighted mean.

Show your work.

Answer:

$$\text{Final mark} = 75(0.5) + 80(0.4) + 65(0.1) \quad \leftarrow \text{1 mark for multiplication}$$
$$= 37.5 + 32 + 6.5 \quad \leftarrow \text{1 mark for addition}$$
$$= 76$$

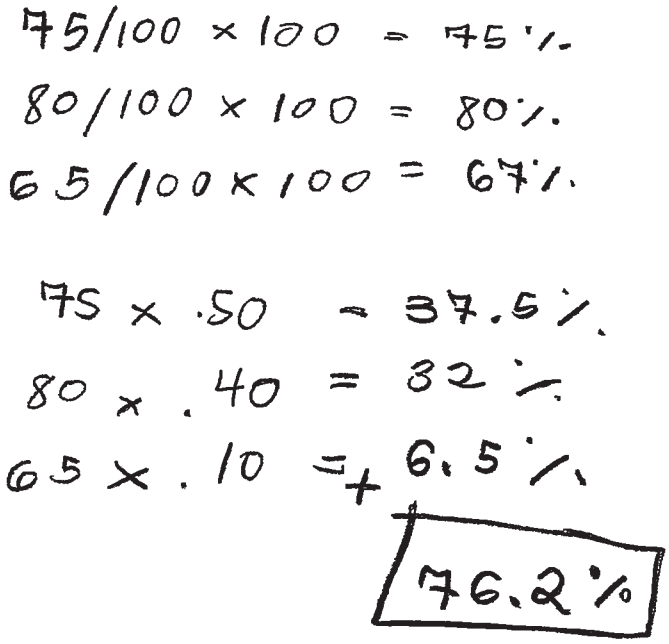
OR

Answer:

$$\text{Final mark} = \frac{(75 \times 50) + (80 \times 40) + (65 \times 10)}{100} \quad \leftarrow \text{1 mark for multiplication}$$
$$\leftarrow \text{1 mark for addition}$$
$$= \frac{7600}{100}$$
$$= 76$$

Exemplar 1

2 marks

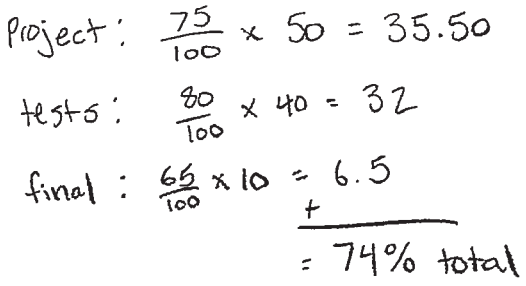


Mark: 1.5 out of 2

Rationale: Award full marks
0.5 mark deduction for arithmetic error

Exemplar 2

2 marks



Mark: 1.5 out of 2

Rationale: Award full marks
0.5 mark deduction for arithmetic error

Question 24 E5.S.2 1 mark

Choose the letter that best completes the statement below.

On a list of 80 numbers in ascending order, 60 is at the 75th percentile.

Identify the statement that is true.

A) 60 is the 75th number

B) 75% of the numbers are larger than 60

C) 75 numbers are below 60

D) 25% of the numbers are larger than 60

Answer: D

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Question 25 E5.S.1 3 marks

Scott is in a figure skating competition. His scores are indicated in the table below.

	Judge A	Judge B	Judge C	Judge D	Judge E	Judge F
Score	6.8	7.8	6.8	6.7	6.6	6.9

A) State the outlier. (1 mark)

Answer:

7.8 or Judge B

B) Calculate the trimmed mean by removing the highest and lowest scores. (2 marks)

Show your work.

Answer:

$$\text{Trimmed mean} = \frac{6.8 + 6.8 + 6.7 + 6.9}{4} \quad \leftarrow \text{1 mark for addition}$$

$$= \frac{27.2}{4} \quad \leftarrow \text{1 mark for division}$$

$$= 6.8$$

Exemplar 1

3 marks

A) 6.6

B) 6.8 + 6.8 + 6.7 + 6.9 = 27.2

Mark: 1 out of 3

Rationale: Incorrect answer in Part A
1 mark for addition in Part B

Exemplar 2

3 marks

A) Judge E (6.6)
Judge B (7.8)

B) 6.7 + 6.8 + 6.8 + 6.9

$= \frac{27.2}{4}$

$= 6.8$

Mark: 2 out of 3

Rationale: Incorrect answer in Part A
Award full marks in Part B

Exemplar 3

3 marks

A) 7.8

B) $\frac{88.4}{4} = 22.1$

Mark: 2 out of 3

Rationale: Award full marks in Part A
1 mark for division in Part B (follow-through error)

Geometry and Trigonometry

Question 26 E6.G.2 1 mark

Choose the letter that best completes the statement below.

Identify the quadrilateral with diagonals that are equal length.

A) a kite

B) a rhombus

C) a rectangle

D) a parallelogram

Answer: C

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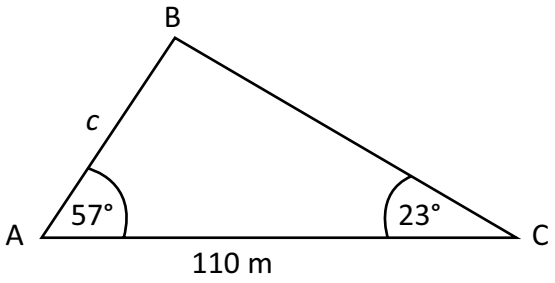
Question 27 E6.G.1 3 marks

Calculate the length of side *c*.



Show your work.

Answer:

$$\angle B = 180° - 57° - 23°$$

$$= 100° \quad \leftarrow \text{1 mark for calculating } \angle B$$

$$\frac{c}{\sin 23°} = \frac{110°}{\sin 100°} \quad \leftarrow \text{0.5 mark for identifying sine law}$$
$$\leftarrow \text{0.5 mark for substitution}$$

$$c = \frac{110°(\sin 23°)}{\sin 100°} \quad \leftarrow \text{1 mark for calculating side } c$$

$$= 43.643\,46...$$

$$= 43.64 \text{ m}$$

Exemplar 1

3 marks

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

$$\frac{\sin 57^\circ}{11.0\text{m}} = \frac{\sin 23^\circ}{b} \times 110\text{m}$$

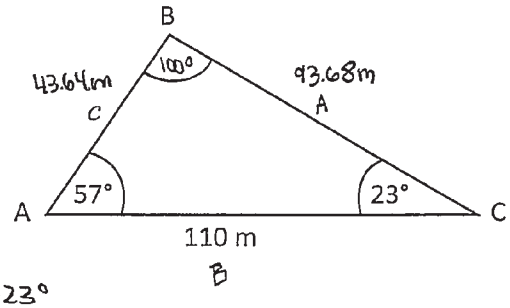
$$= 43.98\text{m}$$

Mark: 0.5 out of 3

Rationale: 0.5 mark for identifying sine law

Exemplar 2

3 marks



$\cos B = 180^\circ - 57^\circ - 23^\circ$

$\cos B = 100^\circ$

$\frac{a}{\sin 57^\circ} = \frac{110\text{m}}{\sin 100^\circ} \times \sin 57^\circ$

$A = 93.68\text{m}$

$c^2 = a^2 + b^2 - 2ab\cos C$

$c^2 = 93.68\text{m}^2 + 110\text{m}^2 - 2(93.68\text{m})(110\text{m})\cos 23^\circ$

$c^2 = 20,875.94\text{m}^2 - 18,971.24$

$\sqrt{c^2} = \sqrt{1,904.70\text{m}^2}$

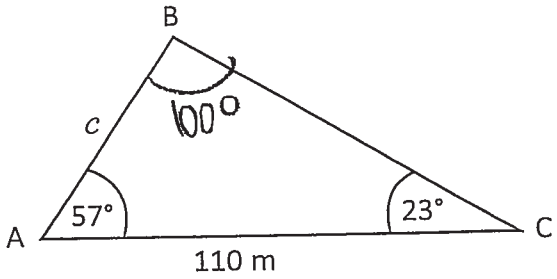
$c = 43.64\text{m}$

Mark: 3 out of 3

Rationale: Award full marks (alternate solution)
E2 (notation error in lines 1 and 2)

Exemplar 3

3 marks



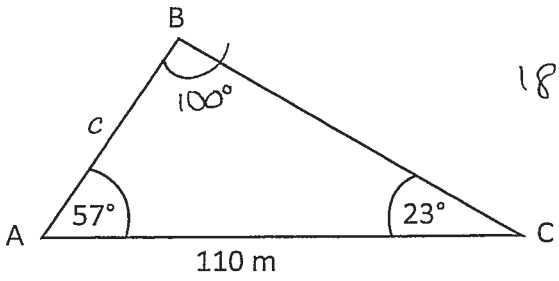
$c^2 = a^2 + b^2$

Mark: 1 out of 3

Rationale: 1 mark for calculating ∠B

Exemplar 4

3 marks



$180° - 57° - 23° = 100° = B$

$\frac{c}{\sin 23°} = \frac{110m}{\sin 100°} = \frac{42.98042413}{\sin 100°} = 43.64346646\ m = 44m$

$c = 44m$

Mark: 3 out of 3

Rationale: Award full marks
E2 (inappropriate use of equal sign)
E6 (rounding: requires two decimals)

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Question 28 E6.G.2 1 mark

Carla used a computer to draw a regular polygon with 30 sides. She claims the sum of its interior angles is 5000°.

Justify why this is not possible.

Sample Answers:

- $\frac{5000°}{180°} = \frac{180°(n-2)}{180°}$

  $27.78 = n - 2$

  $n = 29.78$

  It is impossible for a regular polygon to have a partial side.

- $S = 180°(30 - 2)$

  $= 5040°$

- 5000 divided by 180 does not equal a whole number.

Exemplar 1

1 mark

$S = 180(30-2)$

$S = 5040$

The real sum of interior angles is 5040 not 5000°.

Mark: 1 out of 1

Rationale: Award full marks
E5 (missing units)

Exemplar 2

1 mark

It is not possible because the true sum is 5040°, which could imply that her illustration on the computer is not accurate, making her calculations wrong.

Mark: 1 out of 1

Exemplar 3

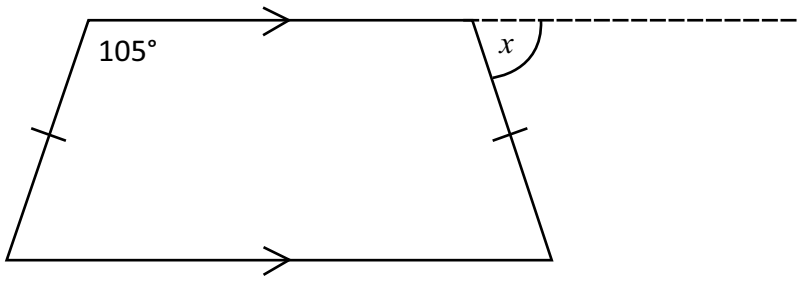
1 mark

because a side of 30 sides will never add up to 5000°

Mark: 0 out of 1

Question 29 E6.G.2 1 mark

Calculate the measure of $\angle x$ in the following diagram.

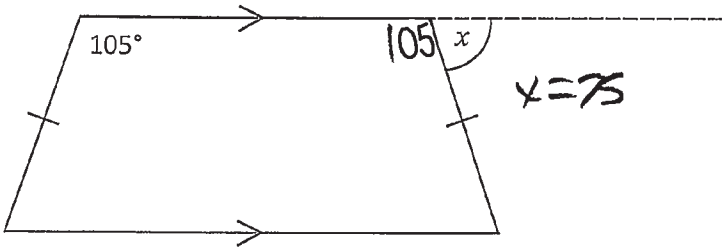


Answer:

$\angle x = 180° - 105°$
$= 75°$ ← 1 mark

Exemplar 1

1 mark

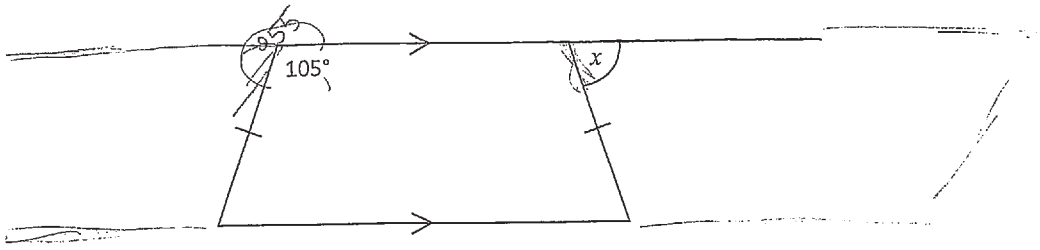


Mark: 1 out of 1

Rationale: Award full marks
E5 (missing units)

Exemplar 2

1 mark



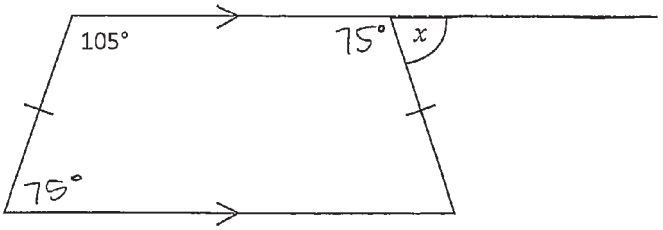
360° - 105° = 255°

x = 255°

Mark: 0 out of 1

Exemplar 3

1 mark

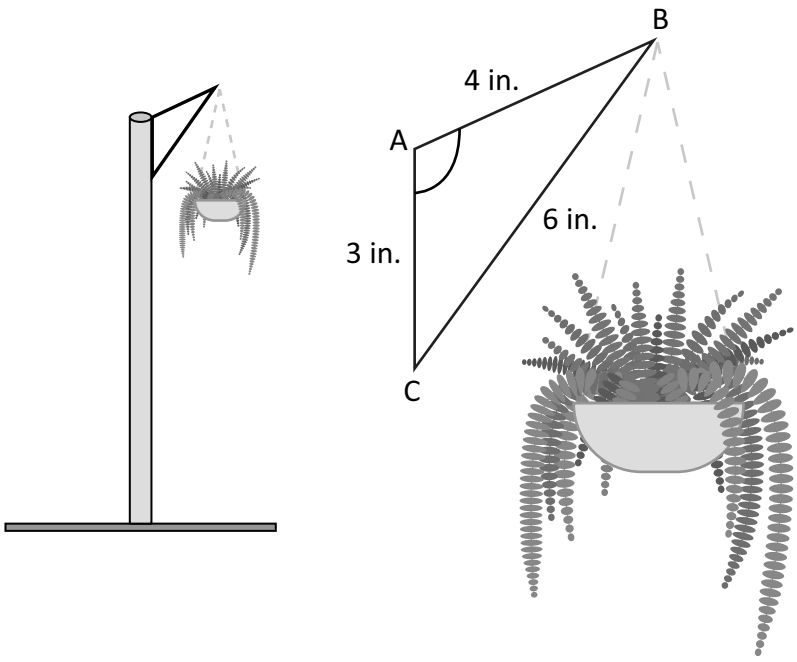


x — 105°

Mark: 0 out of 1

Question 30 E6.G.1 2 marks

Courtney makes a plant hanger for her deck. The braces are 4 inches and 6 inches long, and the anchor points for the braces are 3 inches apart, as shown below.



Calculate the measure of $\angle A$.

Show your work.

Answer:

$$\cos A = \frac{3^2 + 4^2 - 6^2}{2(3)(4)}$$ ← 0.5 mark for identifying cosine law
← 0.5 mark for substitution

$$\cos A = \frac{-11}{24}$$

$$\angle A = \cos^{-1}\left(\frac{-11}{24}\right)$$ ← 1 mark for calculating $\angle A$

$$= 117.279\,61...$$

$$= 117.28°$$

Exemplar 1

2 marks

$$\frac{3^2 + 4^2 - 6^2}{2 \times 3 \times 4} = \cos^{-1}(0.45833)$$

$$= 117^\circ$$

Mark: 2 out of 2

Rationale: Award full marks
E2 (inappropriate use of equal signs)
E6 (rounding: requires two decimals)

Exemplar 2

2 marks

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

$$= \frac{16 + 36 - 9}{2(4)(6)}$$

$$\cos^{-1} \cdot 0.89\ldots$$

$$= 26.39^\circ$$

Mark: 1.5 out of 2

Rationale: 0.5 mark for identifying cosine law
1 mark for calculating $\angle A$ (follow-through error)

Question 31 E6.G.2 1 mark

Choose the letter that best completes the statement below.

A triangle has two congruent sides and one angle that measures 120°.

Identify the type of triangle.

A) Acute isosceles triangle

B) Equilateral triangle

C) Obtuse scalene triangle

D) Obtuse isosceles triangle

Answer: D

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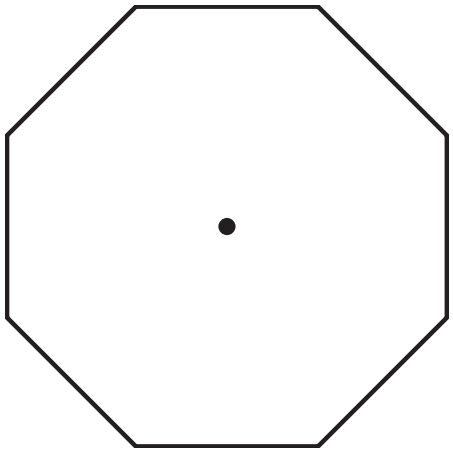
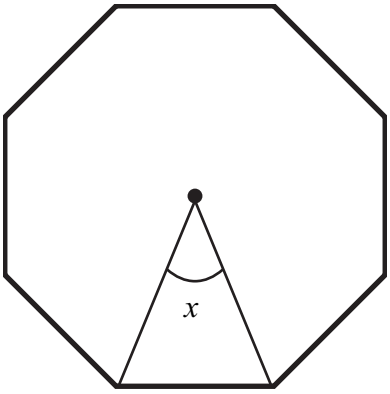
Question 32 E6.G.2 2 marks

A) Sketch and label one central angle, x, of the regular octagon shown below. (1 mark)



Answer:



← 1 mark

B) Calculate the measure of the central angle. (1 mark)

Answer:

$$x = \frac{360°}{n}$$

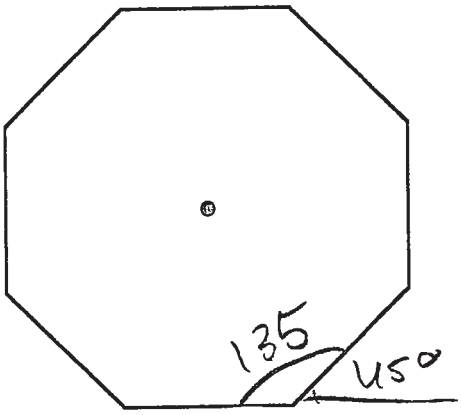
$$= \frac{360°}{8}$$

$$= 45°$$ ← 1 mark

Exemplar 1

2 marks

A)



360 ÷ 8 = 45°

B) 45°

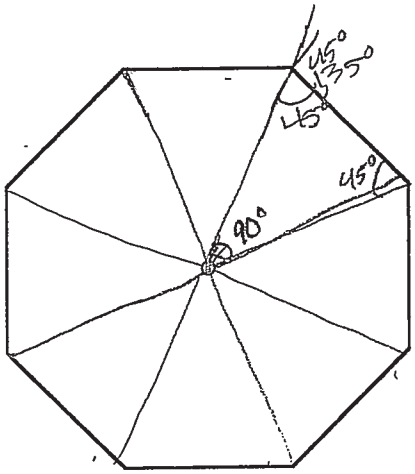
Mark: 1 out of 2

Rationale: Incorrect answer in Part A
Award full marks in Part B

Exemplar 2

2 marks

A)



$\frac{360°}{8} = 45°$

$x = 90°$

B) Calculate the measure of the central angle. (1 mark)

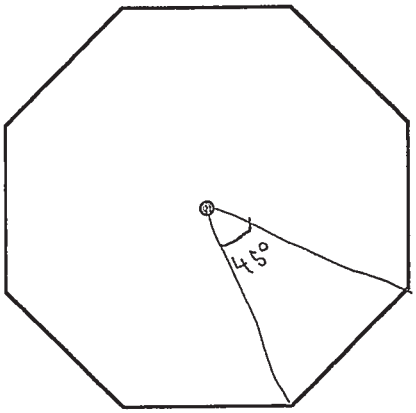
Mark: 1 out of 2

Rationale: Award full marks in Part A
Incorrect answer in Part B

Exemplar 3

2 marks

A)



$C = \frac{360}{8}$

45°

B) 45°

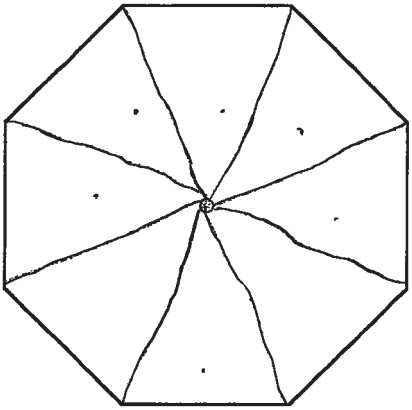
Mark: 2 out of 2

Rationale: Award full marks
E1 (final answer not clearly indicated) in Part A

Exemplar 4

2 marks

A)



B) central angle $= \frac{360}{n}$

$= \frac{360}{8}$ $= 45°$

Mark: 1 out of 2

Rationale: Incorrect answer in Part A
Award full marks in Part B

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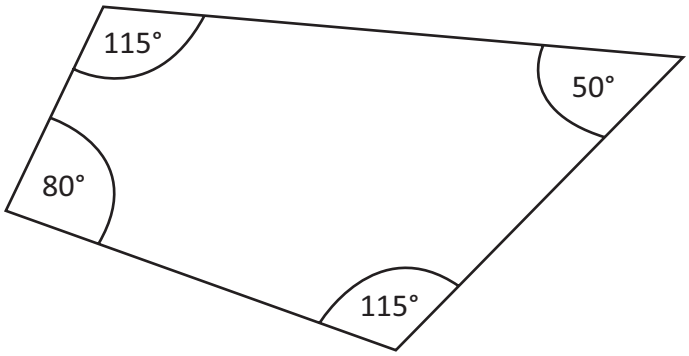
Question 33 E6.G.2 1 mark

Wayne draws the following quadrilateral and claims that it is a parallelogram.



Describe one reason why he is incorrect.

Sample Answers:

- both pairs of opposite angles are not congruent
- opposite sides are not congruent
- consecutive angles are not supplementary
- both pairs of opposite sides are not parallel

Exemplar 1

1 mark

No equal angles

Mark: 0 out of 1

Exemplar 2

1 mark

needs two side the same

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (which two sides?)

Exemplar 3

1 mark

No parallels.

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (which sides?)

Home Finance

Question 34 E6.H.1 3 marks

Myx insures a house worth $220 000 in Area 3. They choose a $200 deductible for their comprehensive coverage.

Calculate their annual insurance premium. Refer to the table on the following page.

Show your work.

Answer:

First $200 000 $= \$799$ ← 0.5 mark for first $200 000 insurance premium

Next $20 000 $= \frac{20\,000}{1000} \times 3.91$ ← 1 mark for multiplication

$= \$78.20$

Subtotal $= 799 + 78.20$ ← 0.5 mark for addition

$= \$877.20$

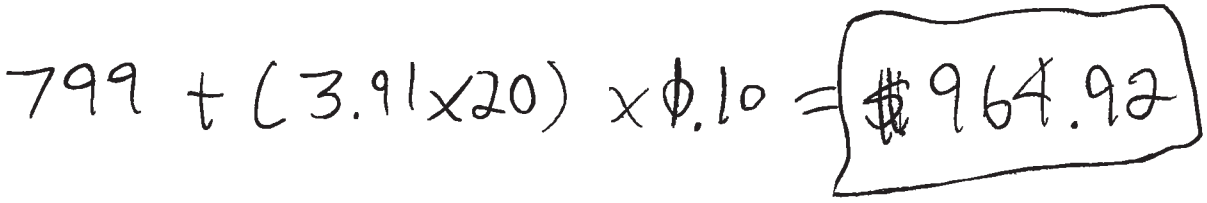
Total with $200 deductible $= 877.20 \times 1.10$ ← 1 mark for calculating annual insurance premium

$= \$964.92$

Note to marker: Award the 0.5 mark if the student identified $799 on the table.

Exemplar 1

3 marks

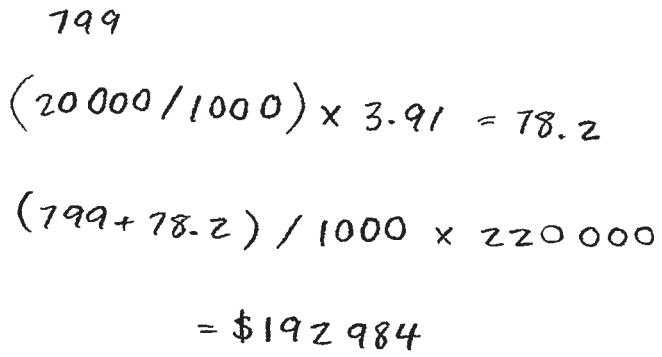


Mark: 3 out of 3

Rationale: Award full marks
E2 (inappropriate use of equal sign)

Exemplar 2

3 marks

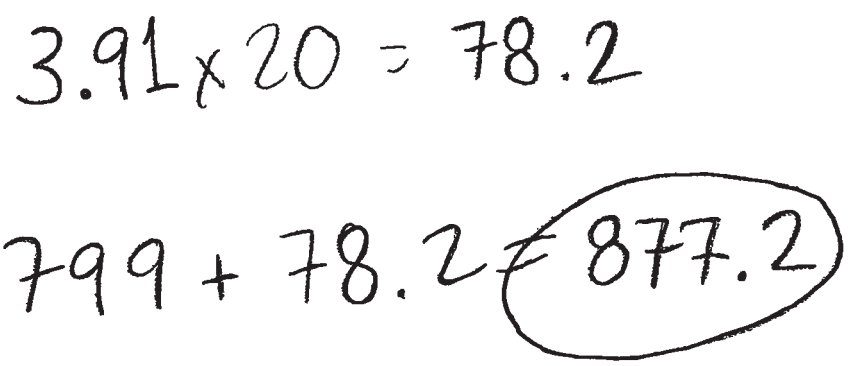


Mark: 1 out of 3

Rationale: 0.5 mark for first $200 000 insurance premium
1 mark for multiplication
0.5 mark for addition
1 mark deduction for concept error in line 3

Exemplar 3

3 marks

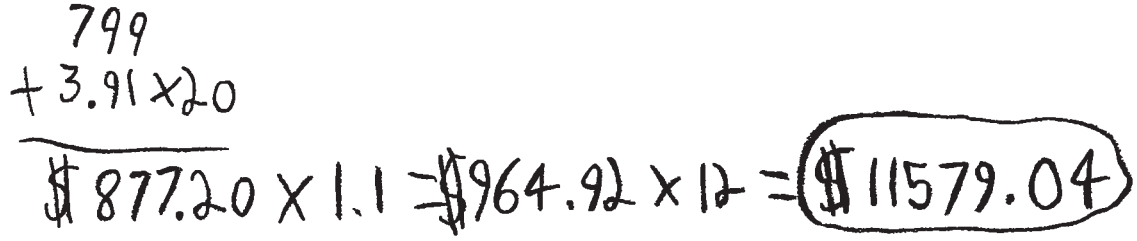


Mark: 2 out of 3

Rationale: 0.5 mark for first $200 000 insurance premium
1 mark for multiplication
0.5 mark for addition
E5 (missing units)
E6 (rounding: money requires two decimals)

Exemplar 4

3 marks



Mark: 2 out of 3

Rationale: Award full marks
1 mark deduction for conceptual error (monthly premium)
E2 (inappropriate use of equal signs)

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Question 35 E6.H.1 1 mark

The current mill rate for property taxes in Winnipeg is 27.234 mills.

A house has a portioned assessment of $200 000.

Calculate the municipal tax collected on the house.

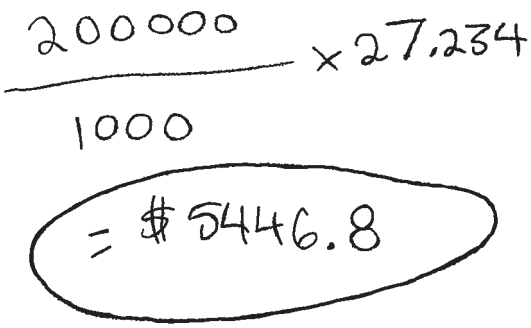
Answer:

$$200\,000 \times \frac{27.234}{1000}$$

$= \$5446.80$ ← 1 mark

Exemplar 1

1 mark

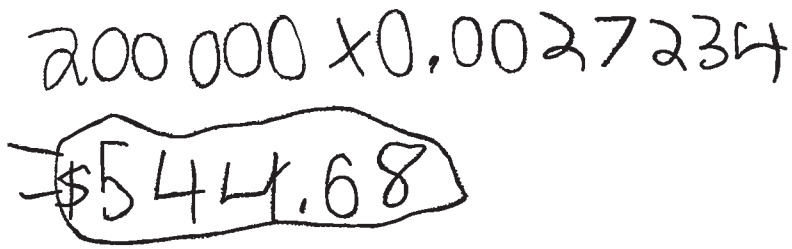


Mark: 1 out of 1

Rationale: Award full marks
E6 (rounding: money requires two decimals)

Exemplar 2

1 mark



Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for procedural error (divided by 10 000)

Question 36 E6.H.1 3 marks

A couple is looking to buy a house with monthly property taxes of $394 and monthly heating costs of $207. Their gross monthly incomes are $4100 and $3275. They anticipate a monthly mortgage payment of $1362.

Calculate their Gross Debt Service Ratio.

Answer:

$$\text{GDSR} = \frac{(1362 + 394 + 207)}{(4100 + 3275)}$$

← 1 mark for addition of monthly costs
← 1 mark for addition of monthly income

$$= \frac{1963}{7375}$$

← 1 mark for calculating GDSR

$$= 0.26616\ldots$$

$$= 0.27 \quad \text{or} \quad 26.62\%$$

Exemplar 1

3 marks

$$\frac{394+207+1362}{4100+3275} = \frac{1758.7}{7375} = 0.238 \times 100 = 23.8\%$$

Mark: 2.5 out of 3

Rationale: Award full marks
0.5 mark deduction for arithmetic error (monthly costs)
E6 (rounding)

Exemplar 2

3 marks

$$GDSR = \frac{(\$1362) + (\$394) + (\$207)}{(\$4100 + \$3275)}$$

$$GDSR = \frac{\$1963}{\$7375} = 0.266$$

$$= 26.6\%$$

Mark: 3 out of 3

Rationale: Award full marks
E6 (rounding)

Exemplar 3

3 marks

$$GDSR = \frac{\$1,362 + \$394 + \$207}{\$4,100 + 3275 = \$7375} \times 100 = 26.62$$

Mark: 3 out of 3

Rationale: Award full marks
E5 (missing units)

Question 37 E6.H.1 2 marks

Homeowners pay a Land Transfer Tax when purchasing a property. The tax is calculated according to the following schedule.

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%

Josey is purchasing a property worth $255 000. The tax amount on the first $200 000 is $1650.

Calculate the total Land Transfer Tax that Josey has to pay.

Show your work.

Answer:

Amount in excess of $200 000 $= 255\,000 - 200\,000$ ← 0.5 mark for subtraction

$= \$55\,000$

Tax on amount in excess of $200 000 $= 55\,000 \times 0.02$ ← 1 mark for calculating tax on excess

$= \$1100$

Total Land Transfer Tax $= 1650 + 1100$ ← 0.5 mark for addition

$= \$2750$

Exemplar 1

2 marks

200 000 = 1650

55000 x 0.2 = 11000

1650 + 11000 = $12650

Mark: 1.5 out of 2

Rationale: Award full marks
0.5 mark deduction for procedural error (incorrect percent conversion)

Exemplar 2

2 marks

55000 x 0.02 = 1100 + 1650

= $2750

Mark: 2 out of 2

Rationale: Award full marks
E2 (inappropriate use of equal signs)

Exemplar 3

2 marks

255000
x 2.0
51000
+ 1650
$ 52650

Mark: 0.5 out of 2

Rationale: 0.5 mark for addition

Question 38 E6.H.1 4 marks

Jackson purchased a house for $460 000. He made a down payment of $95 000 and negotiated a mortgage at an interest rate of 5.5% ammortized over 25 years. At this interest rate, he pays $6.10 per thousand dollars borrowed.

A) Calculate Jackson's monthly mortgage payment. (2 marks)

Show your work.

Answer:

$$\text{Principal borrowed} = 460\,000 - 95\,000 \quad \leftarrow \text{1 mark for subtraction}$$
$$= \$365\,000$$

$$\text{Monthly mortgage payment} = \frac{365\,000}{1000} \times 6.10 \quad \leftarrow \text{1 mark for multiplication}$$
$$= \$2226.50$$

B) Calculate the total amount of interest Jackson will pay over the life of the mortgage. (2 marks)

Show your work.

Answer:

$$\text{Total amount paid} = 2226.50 \times 12 \times 25 \quad \leftarrow \text{1 mark for multiplication}$$
$$= \$667\,950$$

$$\text{Total interest paid} = 667\,950 - 365\,000 \quad \leftarrow \text{1 mark for subtraction}$$
$$= \$302\,950$$

Exemplar 1

4 marks

A) $460000 - 95000 = 365000$

$\frac{365000}{1000} \times 6.10 = \$2226.50$

B) $2226.50 \times 12 \times 25 = 667950$

$667950 - 2226.50 = \$665723.50$

Mark: 3 out of 4

Rationale: Award full marks
1 mark for multiplication in Part B

Exemplar 2

4 marks

A) $460\,000 - 95000$
$= \$365\,000$

$\frac{365000}{1000} (6.10) = \$2226.5$

B) $(25 \times 12)(2226.5)$

$\$667950$

$\$302950$ ← interest

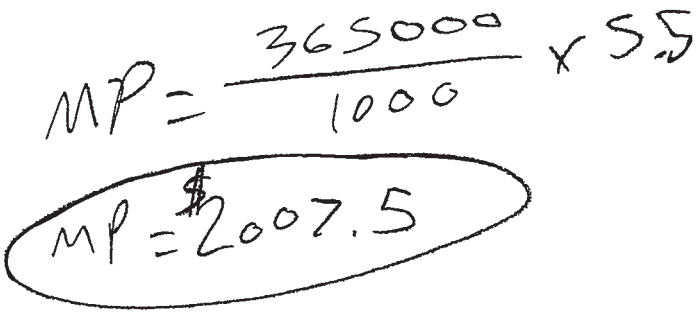
Mark: 4 out of 4

Rationale: Award full marks
E6 (rounding: money requires two decimals)

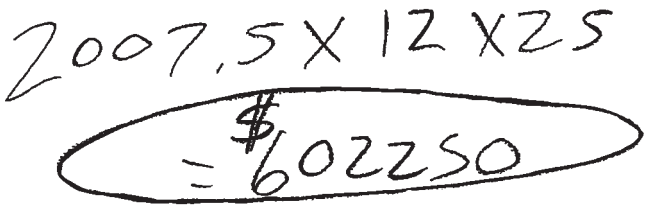
Exemplar 3

4 marks

A)



B)



Mark: 2 out of 4

Rationale: 1 mark for subtraction in Part A
1 mark for multiplication (follow-through error) in Part B

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Question 39 E6.H.1 1 mark

Rajesh's house has a damaged window that causes him to pay an extra $30 per month in heating or cooling costs. It would cost him $1200 to replace the window. Rajesh is planning to sell the house and move in 5 years.

Justify whether Rajesh should replace the window.

Sample Answers:

- Additional cost $= 30 \times 12 \times 5$
  $= \$1800$

  Yes, he should replace it and save himself $600.

- Yes, he should replace it since the house will have a better resale value with a fixed window.
- No, because even though Rajesh can pay the extra $30/month, he may not have $1200 up front.

Exemplar 1

1 mark

Because the the house will be worth more and he will make more when he sells

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity (does not specify yes or no)

Exemplar 2

1 mark

It would cost $1800 to repair the window every month for the next five years. So he should replace the window as it would save him time and energy

Mark: 0 out of 1

Exemplar 3

1 mark

he shouldn't do it right away since it would cost so much and he would have to wait for a long time

Mark: 0.5 out of 1

Rationale: Award full marks
0.5 mark deduction for lack of clarity ("right away")

Appendices

Appendix A: Table of Questions by Unit and Learning Outcome

Probability		
Question	**Learning Outcome**	**Mark**
1	E6.P.1	1
2	E6.P.1	1
3 a)	E6.P.1	1
3 b)	E6.P.1	1
4 a)	E6.P.1	2
4 b)	E6.P.1	1
5	E6.P.1	1
6	E6.P.1	2
		Total = 10

Vehicle Finance		
Question	**Learning Outcome**	**Mark**
7 a)	E5.V.1	1.5
7 b)	E5.V.1	1
8	E5.V.1	1
9	E5.V.1	2
10 a)	E5.V.1	1
10 b)	E5.V.1	1.5
11	E5.V.1	1
12	E5.V.1	3
13	E5.V.1	2
14	E5.V.1	1
		Total = 15

Precision Measurement		
Question	**Learning Outcome**	**Mark**
15 a)	E5.P.1	1
15 b)	E5.P.1	1
16	E5.P.1	2
17 a)	E5.P.1	1
17 b)	E5.P.1	2
18 a)	E5.P.1	2
18 b)	E5.P.1	1
19 a)	E5.P.1	2
19 b)	E5.P.1	1
		Total = 13

Statistics		
Question	**Learning Outcome**	**Mark**
20	E5.S.1	1
21 a)	E5.S.1	2
21 b)	E5.S.1	1
22	E5.S.2	1
23	E5.S.1	2
24	E5.S.2	1
25 a)	E5.S.1	1
25 b)	E5.S.1	2
		Total = 11

Geometry and Trigonometry		
Question	**Learning Outcome**	**Mark**
26	E6.G.2	1
27	E6.G.1	3
28	E6.G.2	1
29	E6.G.2	1
30	E6.G.1	2
31	E6.G.2	1
32 a)	E6.G.2	1
32 b)	E6.G.2	1
33	E6.G.2	1
		Total = 12

Home Finance		
Question	**Learning Outcome**	**Mark**
34	E6.H.1	3
35	E6.H.1	1
36	E6.H.1	3
37	E6.H.1	2
38 a)	E6.H.1	2
38 b)	E6.H.1	2
39	E6.H.1	1
		Total = 14

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: Marking Guidelines

Errors that are conceptually related to the learning outcomes associated with the question will result in a 1 mark deduction.

Each time a student makes one of the following errors, a 0.5 mark deduction will apply:

- arithmetic error
- procedural error
- terminology error in explanation
- lack of clarity in written responses

Communication Errors

The following errors, which are not conceptually related to the learning outcomes associated with the question, may 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 stated
- final answer not clearly indicated
- answer presented in another part of question

E2 (Notation)

- notation error
- inappropriate use of equal sign

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 paints)

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 decimals)