

Grade 12
Essential Mathematics
Achievement Test

Marking Guide

June 2015

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

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Marking Guidelines

The *Grade 12 Essential Mathematics Achievement Test: Marking Guide (June 2015)* is based on *Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes (2014)*.

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.

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 scores.
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.

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*.

Presentation of the Student Samples

Each constructed-response question is presented using the following sections:

Test Item Number

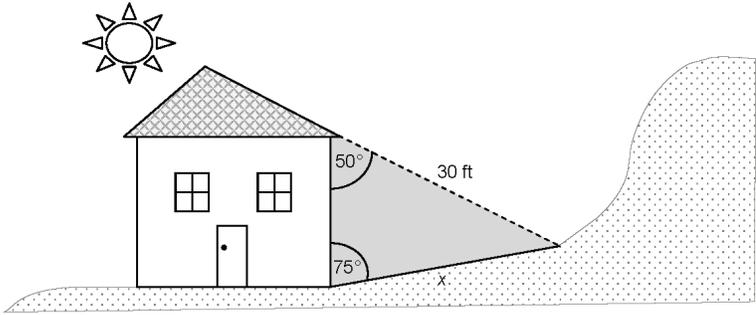
Maximum Number of Marks Allotted

Question 26

(2 Marks)

This section presents the test item as it appears in the student booklet, including how marks should be allotted.

A building is on the side of a hill. Calculate the length of shadow the building will cast.



Answer:

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

$$\frac{30}{\sin 75^\circ} = \frac{x}{\sin 50^\circ} \left\{ \leftarrow 1 \text{ mark for process} \right.$$

$$x = \frac{30 \times (\sin 50^\circ)}{\sin 75^\circ}$$

$x = 23.8 \text{ ft} \quad \leftarrow 1 \text{ mark}$

Note to marker: Units are not required. Allow for appropriate roundings.

Exemplar 1

(2 Marks)

This section presents student sample responses with the mark(s) allotted and the rationale justifying the mark(s) allotted.

$$x = \sin 50^\circ \left(\frac{30}{\sin 75} \right)$$

$$x = 23.79$$

$$x = 23 \text{ feet}$$

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

Home Finance

Question 1

(4 Marks)

Lorenzo wants to buy a house. His monthly property taxes will be \$125, his monthly heating costs will be \$160, and his monthly mortgage payment will be \$1216. He has a gross income of \$38 400 per year.

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

Answer:

Gross monthly income: $\$38\,400 \div 12 = \3200

$$GDSR = \frac{\begin{array}{c} \text{Monthly} \quad \text{Monthly} \quad \text{Monthly} \\ \text{mortgage} + \text{property} + \text{heating} \\ \text{payment} \quad \text{taxes} \quad \text{costs} \end{array}}{\text{Gross monthly income}} \times 100$$

$$= \frac{\$1216 + \$125 + \$160}{\$3200} \times 100$$

{

No mark for 1 correct substitution

OR

1 mark for 2 or 3 correct substitutions

OR

2 marks for all correct substitutions

$$= 47\% \quad \text{or} \quad 0.47 \quad \leftarrow 1 \text{ mark}$$

Note to marker: Units are not required.

B) Explain if his loan application will be approved based on the GDSR calculated in Part A. (1 mark)

Sample answers:

His GDSR is over 32%, so it will probably not be approved.

Note to marker: Student must refer to 32%.

Exemplar 1

(4 Marks)

A) $GDSR = \frac{1216 + 125 + 160}{2833.33} \times 100 = \1341.06 $38\,400 \div 12 = 2833.33$

B) *The bank will approve his mortgage loan application because it's over 40%*

Mark: 1 out of 4

Rationale: - Three correct substitutions in Part A (1 mark)
- Incorrect answer in Part A
- Incorrect response in Part B

Exemplar 2

(4 Marks)

A) $GDSR = \frac{\$125 + \$160 + \$1216}{\$3200} \quad 38\,400 \div 12 = 3200$

$$GDSR = \frac{1501}{3200}$$

$$GDSR = 0.4690 \times 100$$

$$GDSR = \$46.9$$

B) *No because he has a bad GDSR.*

Mark: 2 out of 4

Rationale: - All correct substitutions in Part A (2 marks)
- Incorrect answer in Part A (units)
- Incorrect response in Part B

Exemplar 3

(4 Marks)

A) $GDSR = \frac{(125 + 160 + 1216) \times 100}{38\,400} = 3.90$

$$GDSR = (3.90)$$

B) *The bank will approve his mortgage loan application because his percentage is over 32% so that makes him able to receive a mortgage loan.*

Mark: 2 out of 4

Rationale: - Three correct substitutions in Part A (1 mark)
- Correct answer in Part A (follow-through error) (1 mark)
- Incorrect response in Part B

Question 2

(2 Marks)

State 2 ways to reduce the interest paid over the life of a mortgage.

Sample answers:

- *larger down payment*
- *shorter amortization period*
- *larger monthly payments*
- *increase payment frequency*
- *negotiate a lower interest rate*

(2 × 1 mark)

Exemplar 1

(2 Marks)

To reduce total interest paid:

1. Down payment
2. Shorter mortgage time (Pay larger chunks of cash)

Mark: 1 out of 2

Rationale: - One correct response (shorter mortgage) (1 mark)

Exemplar 2

(2 Marks)

- 1) Pay weekly, biweekly or bimonthly
- 2) A bank will often allow a lump sum to be paid once a year, take advantage and put whatever you can on it at that time.

Mark: 2 out of 2

Rationale: - Two correct responses (2×1 mark)

Exemplar 3

(2 Marks)

- Have a shorter mortgage time period
- Buy a less expensive house

Mark: 2 out of 2

Rationale: - Two correct responses (2×1 mark)

Question 3

(2 Marks)

Betty bought a house for \$185 000. She already knows that for the first \$150 000 the land transfer tax will cost \$900. Calculate the total land transfer tax.

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%

Answer:

First \$150 000: \$900

$$\$185\,000 - \$150\,000 = \$35\,000$$

$$\begin{aligned} \text{Next } \$35\,000: & \quad \$35\,000 \times 0.015 \\ & = \$525 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Total land} \\ \text{transfer tax:} & \quad \$900 + \$525 \\ & = \$1425 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(2 Marks)

$$185\ 000 \times 0.015 = \$2775$$

$$\text{Land Transfer Tax} = \$2775$$

Mark: 0 out of 2

Rationale: - Incorrect amount for the next \$35 000
- Incorrect answer

Exemplar 2

(2 Marks)

$$185\ 000 - 150\ 000 = 35\ 000$$

$$35\ 000 \times 0.005 = 175$$

$$900 + 175 = \$1075$$

Mark: 1 out of 2

Rationale: - Incorrect amount for the next \$35 000
- Correct answer (follow-through error) (1 mark)

Exemplar 3

(2 Marks)

$$35\ 000 \times 0.015 = \underline{\underline{\$525}}$$

Mark: 1 out of 2

Rationale: - Correct amount for the next \$35 000 (1 mark)
- Incorrect answer

Question 4

(2 Marks)

Linnea buys a house. Two (2) of her daily (on-going) expenses are heating costs and mortgage payments. State another 2 daily (on-going) house expenses.

Expenses
1.
2.

Sample answers:

- *Water and sewage bill*
- *Hydro bill*
- *Property taxes*
- *Home insurance*

(2 × 1 mark)

Exemplar 1

(2 Marks)

Expenses	
1.	<i>lawyer's fee</i>
2.	<i>mortgage payment</i>

Mark: 0 out of 2**Rationale:** - Two incorrect responses**Exemplar 2**

(2 Marks)

Expenses	
1.	<i>Moving expense</i> <i>Water and sewage bill</i>
2.	<i>Telephone bill</i>

Mark: 1 out of 2**Rationale:** - Incorrect response in first box (correct response not clearly indicated)
- One correct response (bill) (1 mark)**Exemplar 3**

(2 Marks)

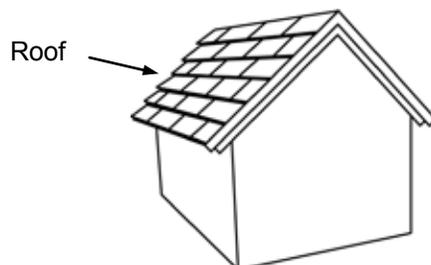
Expenses	
1.	<i>Hydro bill</i> <i>Property taxes</i>
2.	

Mark: 2 out of 2**Rationale:** - Two correct responses (2 × 1 mark)

Question 5

(2 Marks)

Homeowners are responsible for preventative maintenance and emergency repairs on the roof of a house.



- A) Describe an example of preventative maintenance that should be done to the roof of a house. (1 mark)

Sample answers:

- *clearing gutters*
- *trimming overhanging trees*
- *replacing shingles showing obvious wear*
- *replacing shingles starting to curl on ends*
- *shoveling snow off the roof*

- B) Describe an example of an emergency repair that would need to be done to the roof of a house. (1 mark)

Sample answers:

- *fixing a leaking roof*
- *removing a tree that fell on the house*
- *replacing damaged or missing shingles after a bad storm*

Note to marker: Student must describe the repair, not solely the cause of the repair.

Exemplar 1

(2 Marks)

- A) *The shingles are old, but the roof doesn't leak.*
- B) *Strong wind blows off some of the shingles and the roof leaks.*

Mark: 0 out of 2**Rationale:** - Two incorrect responses**Exemplar 2**

(2 Marks)

- A) *When you don't like the colour of the shingles and you want something else.*
- B) *An emergency would be when the roof is leaking and you need to repair it ASAP.*

Mark: 1 out of 2**Rationale:** - One correct response in Part B (1 mark)**Exemplar 3**

(2 Marks)

- A) *A preventative situation would be for example you watch in the news that a heavy storm is your town in a couple hours. The first thing I would do is to re-shingle my roof make it stronger so the water doesn't come in.*
- B) *An emergency re-shingle would be if for any reason your roof breaks and a big hole is on it. The weather is -40 and snowing. I would go buy supplies and get up there and start fixing it as soon as possible.*

Mark: 2 out of 2**Rationale:** - Two correct responses (2 × 1 mark)

Question 6

(2 Marks)

Sacha recently purchased a new house with a 20-year mortgage of \$174 000. Her monthly mortgage payment is \$1096.20.

- A) State the total amount that Sacha will have repaid to the bank at the end of the mortgage. (1 mark)

Answer:

$$\begin{aligned} \text{Total paid: } & \$1096.20 \times 12 \times 20 \\ & = \$263\,088 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

- B) State the total amount of money paid in interest to the bank over the life of the mortgage. (1 mark)

Answer:

$$\begin{aligned} \text{Total interest: } & \$263\,088 - \$174\,000 \\ & = \$89\,088 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(2 Marks)

$$\begin{array}{r} \text{A) } 1096.20 \times 12 \times 20 = 263\,088 \\ - 174\,000 \\ \hline \$89\,088 \end{array}$$

$$\text{B) } \$263\,088$$

Mark: 0 out of 2

Rationale: - Incorrect answer (total paid) in Part A
- Incorrect answer in Part B

Exemplar 2

(2 Marks)

$$\text{A) } 1096.20 \times 240 = 263\,088$$

$$\begin{array}{r} \text{B) } 174\,000 \\ - 263\,088 \\ \hline 98\,088 \end{array}$$

Mark: 1 out of 2

Rationale: - Correct answer in Part A (1 mark)
- Incorrect answer in Part B

Exemplar 3

(2 Marks)

$$\begin{array}{l} \text{A) } \$1096.20 \times 240 \text{ month} \\ = \boxed{\$263\,088} \text{ repaid} \end{array}$$

$$\begin{array}{l} \text{B) } \$263\,088 \times 0.13 \\ = \boxed{\$34\,201.44} \end{array}$$

Mark: 1 out of 2

Rationale: - Correct answer in Part A (1 mark)
- Incorrect answer in Part B

Probability

Question 7

(2 Marks)

There are 12 red and 28 blue marbles placed in a box.

A) State the probability of randomly selecting a red marble. (1 mark)

Answer:

$\frac{12}{40}$ or 0.3 or 30% or 3:10 or three out of ten

Note to marker: Accept equivalent representations.

B) State the odds **against** choosing a red marble. (1 mark)

Answer:

28:12 or 28 to 12

Note to marker: Accept equivalent ratios.

Exemplar 1

(2 Marks)

A) $\frac{12}{40}$

B) $\frac{28}{12}$

Mark: 1 out of 2**Rationale:** - Correct answer in Part A (1 mark)
- Incorrect answer in Part B (incorrect format)**Exemplar 2**

(2 Marks)

A) *The probability of her randomly selecting a red marble are 12:28 or 42.86%.*B) *16:12 is the odds of her choosing a red marble against her.***Mark: 1 out of 2****Rationale:** - Incorrect answer in Part A
- Correct answer in Part B (follow-through error) (1 mark)**Exemplar 3**

(2 Marks)

A) $(12 + 28 = 40)$

B) $7:3$

$$12 \times 100 \div 40 = 30\% \text{ or } 0.30$$

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

Question 8

(1 Mark)

State the probability of randomly choosing the letter “B” from the letters in the word “probability.”

PROBABILITY

Answer:

$\frac{2}{11}$ or 0.18 or 18% or two out of eleven or 2:11

Exemplar 1

(1 Mark)

 $2:11$ $20\%?$ **Mark: 0 out of 1****Rationale:** - Incorrect answer (correct answer not clearly indicated)**Exemplar 2**

(1 Mark)

 $2:9$

The probability of her choosing a "B" are $2:9$ or 18.18% .

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

(1 Mark)

 $odds\ 2:9$ $probability\ 2:11$ **Mark: 1 out of 1****Rationale:** - Correct answer (1 mark)

Question 9

(4 Marks)

Howard spends \$1.55 on each food sample he gives away at his restaurant. There is an 8% chance that after tasting the sample, the customer will order the new menu item. Howard earns \$20 for every new menu item he sells.

A) Determine the expected value of the food sample. (3 marks)

Answer:

$$\begin{aligned} \$gain &= \$20 - \$1.55 \\ &= \$18.45 \end{aligned}$$

$$\$loss = \$1.55$$

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

$$= 0.08 \times \$18.45 - 0.92 \times \$1.55 \left\{ \begin{array}{l} \text{No mark for 1 correct substitution} \\ \text{OR} \\ \text{1 mark for 2 or 3 correct substitutions} \\ \text{OR} \\ \text{2 marks for all correct substitutions} \end{array} \right.$$

$$= \$0.05 \quad \leftarrow 1 \text{ mark}$$

OR

$$0.08 \times \$20 = \$1.60 \quad \leftarrow 2 \text{ marks}$$

$$EV = \$1.60 - \$1.55$$

$$= \$0.05 \quad \leftarrow 1 \text{ mark}$$

B) Justify whether Howard should be offering the food samples based on the expected value. (1 mark)

Answer:

Yes, the expected value is greater than 0.

Exemplar 1

(4 Marks)

A) $EV = (0.08 \times 20) - (0.92 \times 1.55)$
 $EV = +\$0.17$

B) It depends on how much money he has. An 8% chance is very low, and he will likely lose money.

Mark: 2 out of 4

- Rationale:**
- Three correct substitutions in Part A (1 mark)
 - Correct answer in Part A (follow-through error) (1 mark)
 - Incorrect response in Part B

Exemplar 2

(4 Marks)

A) $20 - 1.55 = 18.45$

win Expected value = (probability) × (payout)
 $= (0.08) \times (18.45)$
 $= 1.48$

Lose Expected value = (prob.) × (pay.)
 $= (0.92) \times (-1.55)$
 $= -1.43$

B) Personally I don't think he should if he's only expected to gain \$0.05 after working that hard. It doesn't seem worth it.

$1.48 - 1.43 = \$0.05$ expected gain

Mark: 3 out of 4

- Rationale:**
- Correct answer in Part A (3 marks)
 - Incorrect response in Part B

Exemplar 3

(4 Marks)

A)

win	$\frac{8}{100}$	20	1.55	$20 - 1.55$ $= 18.45$	$(\frac{8}{100})(18.45) =$ 1.48
Lose	$\frac{92}{100}$	0\$	1.55	$0 - 1.55$ $= -1.55$	$(\frac{92}{100})(-1.55) =$ -1.43

$\frac{46}{50} = \frac{23}{25}$ $EV: 1.48 + (-1.43)$
 $: 1.48 - 1.43$
 $: \$ 0.05$

B) With his expected value being a positive, he can expect to make money so ya he should continue.

Mark: 4 out of 4

- Rationale:**
- Correct answer in Part A (3 marks)
 - Correct response in Part B (1 mark)

Question 10

(3 Marks)

Random testing of golf balls shows that 100 out of every 5000 are defective.

A) State the odds in favour of a golf ball being defective. (1 mark)

Answer:

$100 : 4900$ or 100 to 4900 ← 1 mark

Note to marker: Accept equivalent ratios.

B) State the probability of a golf ball **not** being defective. (1 mark)

Answer:

$\frac{4900}{5000}$ or 0.98 or 98% or 4900 out of 5000 or $4900 : 5000$ ← 1 mark

Note to marker: Accept equivalent representations.

C) A company produces 80 000 golf balls. State the expected number of defective golf balls. (1 mark)

Answer:

$$\begin{aligned} & \frac{100}{5000} \times 80\,000 \\ &= 0.02 \times 80\,000 \\ &= 1600 \qquad \qquad \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

OR

$$\begin{aligned} \frac{x}{80\,000} &= \frac{100}{5000} \\ x &= 1600 \qquad \qquad \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(3 Marks)

A) $100:5000$
 $1:50$

B) $5000:100$
 $50:1$

C) $80\,000 \div 5000 = 16$
 $16 \times 100 = 1600$
1600 defective golf balls

Mark: 1 out of 3**Rationale:** - Incorrect answer in Part A
- Incorrect answer in Part B
- Correct answer in Part C (1 mark)**Exemplar 2**

(3 Marks)

A) $100:5000$

B) $\frac{4900}{5000}$

C) $\frac{100 \times 16}{5000 \times 16}$ $\frac{1600 \leftarrow \text{expected number}}{80\,000}$ of defective

$$\frac{80\,000}{5000} = 16$$

Mark: 2 out of 3**Rationale:** - Incorrect answer in Part A
- Correct answer in Part B (1 mark)
- Correct answer in Part C (1 mark)**Exemplar 3**

(3 Marks)

A) $100:4900$

B) $\frac{4900}{5000}$

C) $\frac{80\,000}{5000} = 16 \times 100 = \boxed{16\,000}$

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

Question 11

(2 Marks)

The Teddy Bear Factory hosts birthday parties where children can build their own teddy bears. They offer 4 different party packages that are equally likely to be chosen. Their sales during the last month were as follows:



Red package: 18
Blue package: 34
Green package: 16
Yellow package: 12

- A) The Smith family would like to book a party. State the experimental probability that the Smith family will choose the yellow package. (1 mark)

Answer:

$\frac{12}{80}$ or 0.15 or 15% or 12 : 80 or 12 out of 80

- B) State the theoretical probability that the Smith family will choose the yellow package. (1 mark)

Answer:

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

Note to marker: Accept equivalent representations.

Exemplar 1

(2 Marks)

A) $\frac{12}{80}$ 0.15 15%

B) $\frac{1}{4} = 25\%$ 0.25

$\frac{1}{4} = 0.25$ 25%

Mark: 1 out of 2

Rationale: - Incorrect answer in Part A (correct answer not clearly indicated)
 - Correct answer in Part B (1 mark)

Exemplar 2

(2 Marks)

A) Experimental probability = $\frac{\text{desired events}}{\text{total observed}}$

B) $tp = \frac{\text{desired}}{\text{total possible}}$

$EP = \frac{12}{80}$ EP = 0.15

$tp = \frac{12}{68} = 0.176$

Mark: 1 out of 2

Rationale: - Correct answer in Part A (1 mark)
 - Incorrect answer in Part B

Exemplar 3

(2 Marks)

18 red packages
 34 blue packages
 16 green packages
 12 yellow packages } 80

B) $100 \div 4 = 25$

25%

A) $P = 12 \div 80 \times 100 = 15$

15%

Mark: 2 out of 2

Rationale: - Correct answer in Part A (1 mark)
 - Correct answer in Part B (1 mark)

Vehicle Finance

Question 12

(2 Marks)

Describe 2 disadvantages of leasing a new car.

Sample answers:

- *cannot modify the car*
- *mileage restriction (extra costs if over km limit)*
- *extra costs for wear and tear*
- *if always leasing you'll have monthly payments forever*
- *no equity gained*
- *more expensive to buy it out at the end of the lease*

(2 × 1 mark)

Exemplar 1

(2 Marks)

- 1) monthly payment
- 2) you pay for km

Mark: 0 out of 2**Rationale:** - Two incorrect responses**Exemplar 2**

(2 Marks)

- It costs more than buying a car
- You have to give it back when your lease is done

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

(2 Marks)

you don't get to own it and pay for damages when you return it?

Mark: 1 out of 2**Rationale:** - One correct response (pay for damages) (1 mark)

Question 13

(4 Marks)

Carter is purchasing a new vehicle for \$27 800, after taxes. He makes a down payment of \$3000. The bank offers financing for 5 years at a rate of 6.25%.

Monthly Vehicle Loan Payments per \$1000 borrowed					
Interest Rate (%)	Years to Repay Loan				
	1	2	3	4	5
5.00	\$85.61	\$43.87	\$29.97	\$23.03	\$18.87
5.25	85.72	43.98	30.08	23.14	18.99
5.50	85.84	44.10	30.20	23.26	19.10
5.75	85.95	44.21	30.31	23.37	19.22
6.00	86.07	44.32	30.42	23.49	19.33
6.25	86.18	44.43	30.54	23.60	19.45
6.50	86.30	44.55	30.65	23.71	19.57
6.75	86.41	44.66	30.76	23.83	19.68
7.00	86.53	44.77	30.88	23.95	19.80

- A) Calculate the monthly payment. (3 marks)

Answer:

$$\begin{aligned} \text{Principal:} \quad & \$27\,800 - \$3000 \\ & = \$24\,800 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Monthly payment:} \quad & \frac{\$24\,800}{1000} \times \underbrace{19.45}_{1 \text{ mark}} \\ & = \$482.36 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

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

- B) Calculate the total paid for the vehicle by the end of the 5-year term. (1 mark)

Answer:

$$\begin{aligned} \text{Total cost:} \quad & (\$482.36 \times 12 \times 5) + \$3000 \\ & = \$31\,941.60 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(4 Marks)

A) $27\,800 + 3000 \div 12 = 2566$

B) $27\,800 + 3000 \times 19.45 = 86\,150$

Mark: 0 out of 4**Rationale:** - Incorrect answer in Part A
- Incorrect answer in Part B**Exemplar 2**

(4 Marks)

A) $27\,800 - 3000 = 24\,800 \times 5 \times 19.45 = \$2\,411\,800.00$

B)

Mark: 2 out of 4**Rationale:** - Correct principal in Part A (1 mark)
- Correct table value in Part A (1 mark)
- Incorrect answer in Part B**Exemplar 3**

(4 Marks)

A) $27\,800 \cdot 1.13 = \$31\,414 - 3000$

monthly payment $\frac{28\,414}{1000} \cdot 19.45 = \underline{\underline{\$552.65}}$

B) $552.65 \cdot 60 = 33\,159 + \text{down payment}$
 $\underline{\underline{\$36\,159}}$

Mark: 3 out of 4**Rationale:** - Correct table value in Part A (1 mark)
- Correct total in Part A (follow-through error) (1 mark)
- Correct answer in Part B (follow-through error) (1 mark)

Question 14

(2 Marks)

A previously leased vehicle with an original value of \$18 300 is for sale at a Manitoba dealership. The residual value is 58%. Calculate the total cost to buy the car, after taxes.

Answer:

$$\begin{aligned} \text{Residual value: } & \$18\,300 \times 0.58 \\ & = \$10\,614 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Total cost: } & \$10\,614 \times 1.13 \\ & = \$11\,993.82 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

OR

$$\text{Taxes: } \quad \$18\,300 \times 1.13 = \$20\,679 \quad \leftarrow 1 \text{ mark}$$

$$\text{Total cost: } \quad \$20\,679 \times 0.58 = \$11\,993.82 \quad \leftarrow 1 \text{ mark}$$

OR

$$\begin{aligned} \$18\,300 \times \underbrace{0.58 \times 1.13}_{1 \text{ mark}} & = \$11\,993.82 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(2 Marks)

$$\begin{array}{r} \text{Price} \quad 18\,300.00 \times 0.13 = 2379.00 \\ \text{Interest} \quad 18\,300.00 + \\ \quad \quad \quad \underline{2379.00} \\ \$20\,679.00 \times 0.58 = 11\,993.82 \end{array}$$

$$\begin{array}{r} 20\,679.00 + \\ \quad \quad \quad \underline{11\,993.82} \end{array}$$

$\$32\,672.82$ is the total cost to buy the car

Mark: 1 out of 2

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

Exemplar 2

(2 Marks)

$$\$18\,300 \times 0.58 = \$10\,614$$

$$\$18\,500 - \$10\,614 = \$7\,886$$

Mark: 1 out of 2

Rationale: - Correct residual value (1 mark)
- Incorrect total cost

Question 15

(3 Marks)

Paige is planning to go on a 3000 km road trip. She owns a truck and a car. The truck uses 8.5 L of fuel per 100 km. The car uses 6 L of fuel per 100 km.

- A) State which vehicle Paige should use if she wants to get the best fuel economy. (1 mark)

Answer:

The car ← 1 mark

- B) State the number of litres used during the trip by the vehicle selected in Part A. (1 mark)

Answer:

$$\begin{aligned} \text{Number of litres:} &= \frac{6 \text{ L}}{100 \text{ km}} \times 3000 \text{ km} \\ &= 180 \text{ L} \quad \leftarrow 1 \text{ mark} \end{aligned}$$

- C) State the total cost of fuel for the trip if gas costs \$1.23/L. (1 mark)

Answer:

$$\begin{aligned} \text{Cost of the fuel:} &= 180 \text{ L} \times \$1.23/\text{L} \\ &= \$221.40 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(3 Marks)

A)

She should use
the truck

B)

$$8.5 \times 30 = 255 \text{ L used}$$

C)

$$\$207.31$$

$$255 \div 1.23 = \$207.31$$

Mark: 1 out of 3

- Rationale:**
- Incorrect answer in Part A
 - Correct answer in Part B (follow-through error) (1 mark)
 - Incorrect answer in Part C

Exemplar 2

(3 Marks)

A)

the car!

B)

$$\frac{\text{car}}{180 \text{ L}} \quad \frac{\text{truck}}{255 \text{ L}}$$

C)

$$\begin{array}{l} \frac{\text{car}}{30 \times 6} \\ = 180 \\ \times 1.23 \\ = \$2214 \end{array} \quad \begin{array}{l} \frac{\text{truck}}{30 \times 8.5} \\ = 255 \\ \times 1.23 \\ = \$313.65 \end{array}$$

Mark: 2 out of 3

- Rationale:**
- Correct answer in Part A (1 mark)
 - Correct answer in Part B (1 mark)
 - Incorrect answer in Part C

Exemplar 3

(3 Marks)

A)

$$\text{truck: } \frac{25\,500}{3000 \text{ km}} \times 100 = 850 \text{ L}/3000 \text{ km}$$

$$\text{car: } \frac{18\,000}{3000 \text{ km}} \times 100 = 600 \text{ L}/3000 \text{ km}$$

B)

600 L of fuel were
used by the car in the trip

C)

$$\begin{array}{l} \$1.23/\text{L} \times 600 \\ = \$738 \\ \text{paige will spend } \$738 \\ \text{on her trip} \end{array}$$

she should use the car
it has better fuel economy

Mark: 2 out of 3

- Rationale:**
- Correct answer in Part A (1 mark)
 - Incorrect answer in Part B
 - Correct answer in Part C (follow-through error) (1 mark)

Question 16

(3 Marks)

Desarae is purchasing a vehicle in Manitoba through a private sale for \$12 000. A lien search was done for \$18. The book value of the vehicle is listed as \$13 500. Desarae has a safety check performed for \$40. Calculate the total cost of purchasing the vehicle after taxes using the table below.

	Taxes on Vehicle Purchases	
	PST	GST
Buying New	PST	GST
Buying Used from Dealership	PST calculated on greater of book value or purchase price	GST
Buying Used (Private)	PST calculated on greater of book value or purchase price	No GST
Safety	No PST	GST
Materials and Labour	PST	GST
Lien Search	No PST	No GST

Answer:

Vehicle cost: \$12 000

$$\begin{aligned} \text{PST:} \quad & \$13\,500 \times 0.08 \\ & = \$1080 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Safety:} \quad & \$40 \times 1.05 \\ & = \$42 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Lien search: \$18

$$\begin{aligned} \text{Total cost:} \quad & \$12\,000 + \$1080 + \$42 + \$18 \\ & = \$13\,140 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Question 17

(2 Marks)

Bill had his vehicle's exhaust system repaired at a Manitoba car dealership. Labour charges were \$110 per hour. The cost of the exhaust system parts were: converter \$350, muffler \$120 and exhaust pipe \$80. The job required 1.5 hours of labour to complete.

Calculate the total cost of the repairs, after taxes.

Answer:

Materials: $\$350 + \$120 + \$80 = \550

Labour: $1.5 \times \$110 = \underline{\$165}$

Subtotal: $\$715$ $\leftarrow 1 \text{ mark}$

Total cost: $\$715 \times 1.13$
 $= \$807.95$ $\leftarrow 1 \text{ mark}$

Exemplar 1

(2 Marks)

$$\begin{array}{r}
 \text{converter} \quad \$350 \\
 \text{muffler} \quad \quad \$120 \\
 \text{exhaust pipe} \quad \underline{\$80} \\
 \$550 \times 1.13 = 621.50
 \end{array}$$

$$110 \times 1.5 = 165$$

$$621.50 + 165 = \$786.50$$

Mark: 1 out of 2

- Rationale:** - Incorrect subtotal (tax on labour not calculated)
 - Correct total cost (follow-through error) (1 mark)

Exemplar 2

(2 Marks)

$$\begin{array}{r}
 \$110/\text{hr.} \quad \$350 \times 1.13 = 395.5 \\
 \quad \quad \quad \$120 \times 1.13 = 135.6 \\
 \quad \quad \quad \$80 \times 1.13 = 90.4 \\
 \quad \quad \quad \$110 \times 1.5 = 165 \times 1.08 = 178.2
 \end{array}$$

$$\begin{array}{r}
 395.5 + 135.6 + 90.4 + 178.2 \\
 = \$799.7 \text{ for the total cost of repairs.}
 \end{array}$$

Mark: 1 out of 2

- Rationale:** - Incorrect subtotal
 - Correct total cost (follow-through error) (1 mark)

Exemplar 3

(2 Marks)

$$\begin{array}{r}
 350 \times 0.13 = 45.5 \\
 120 \times 0.13 = 15.6 \\
 80 \times 0.13 = 10.4 \\
 1.5 \times 110 = 165 \\
 165 \times 0.13 = 21.45 \\
 \\
 350 + 45.5 = 395.50 \\
 120 + 15.6 = 135.6 \\
 80 + 10.4 = 90.4 \\
 165 + 21.45 = 186.45 \\
 \hline
 807.95
 \end{array}$$

Mark: 2 out of 2

- Rationale:** - Correct subtotal (1 mark)
 - Correct total cost (1 mark)

Question 18

(2 Marks)

State 2 factors that affect the cost of vehicle insurance premiums other than driving record, traffic tickets, and at-fault accidents.

Sample answers:

- *use of vehicle*
- *deductible*
- *electronic immobilizer*
- *type of vehicle (passenger protection/vehicle characteristics/vehicle body size/vehicle year, make, and model/repair costs of vehicle)*
- *third party liability*
- *territory/location*

(2 × 1 mark)

Exemplar 1

(2 Marks)

demerits
no license
accidents

Mark: 0 out of 2**Rationale:** - Two incorrect responses**Exemplar 2**

(2 Marks)

condition of vehicle
your driving record

Mark: 0 out of 2**Rationale:** - Two incorrect responses**Exemplar 3**

(2 Marks)

how often vehicle is driven
age of driver?

Mark: 0 out of 2**Rationale:** - Two incorrect responses

Question 19

(2 Marks)

A car collector owns a vehicle worth \$37 500. The vehicle depreciates 20% per year. Calculate the value of the vehicle after the first year.

Answer:

$$\begin{aligned} \text{Amount of depreciation: } & \$37\,500 \times 0.2 \\ & = \$7\,500 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

$$\begin{aligned} \text{Vehicle value: } & \$37\,500 - \$7\,500 \\ & = \$30\,000 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

OR

$$\begin{aligned} \text{Vehicle value: } & \$37\,500 \times 0.8 \qquad \leftarrow 1 \text{ mark} \\ & = \$30\,000 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

Exemplar 1

(2 Marks)

$$\$37\,500 \times 0.2 = \$7\,500 \quad 0.2 = 20\%$$

Mark: 1 out of 2**Rationale:** - Correct amount of depreciation (1 mark)
- Incorrect vehicle value**Exemplar 2**

(2 Marks)

$$\$30\,000$$

Mark: 1 out of 2**Rationale:** - Correct vehicle value (1 mark)**Exemplar 3**

(2 Marks)

$$\begin{aligned} \$37\,500 \times 0.20 &= \$7\,500 \\ \$37\,500 - \$7\,500 &= \$30\,000 \end{aligned}$$

depreciated \$7500 in year 1

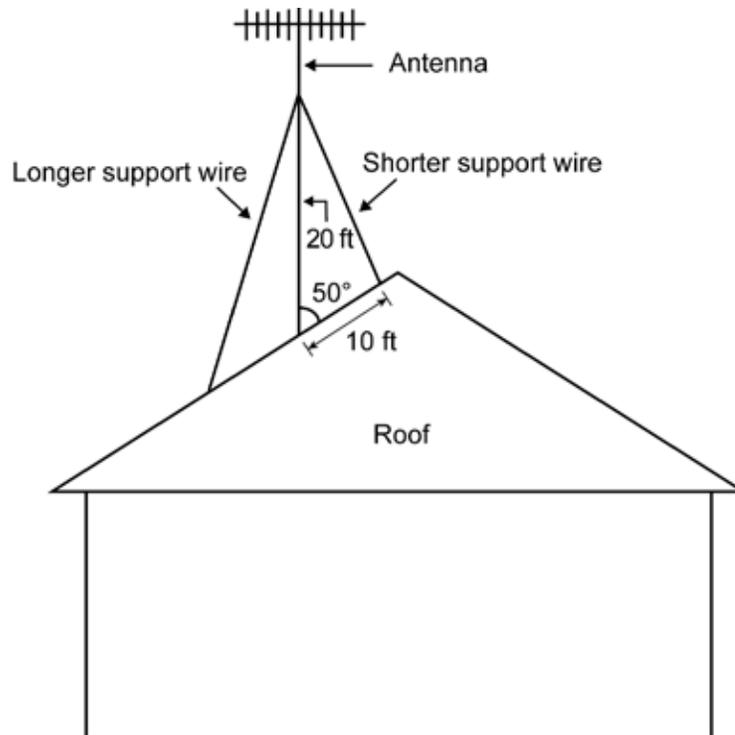
Mark: 2 out of 2**Rationale:** - Correct amount of depreciation (1 mark)
- Correct vehicle value (1 mark)

Geometry and Trigonometry

Question 20

(2 Marks)

A construction company needs to calculate the length of support wires required to install an antenna on a roof. Calculate the length of the shorter support wire.



Test Item and Marking Guide

Answer:

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

$$a^2 = 10^2 + 20^2 - 2(10)(20) \cos 50^\circ$$

$$a^2 = 500 - 257.12$$

$$a = \sqrt{242.88}$$

$$a = 15.6 \text{ ft}$$

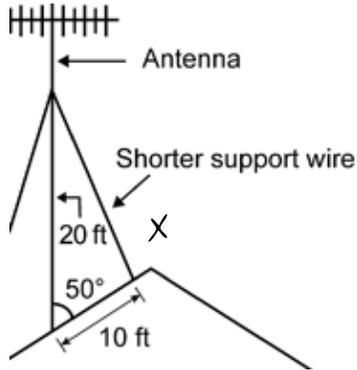
} ← 1 mark for process

← 1 mark

Note to marker: Units are not required. Allow for appropriate roundings.

Exemplar 1

(2 Marks)



$$\sin 50^\circ = \frac{X}{20 \text{ ft}}$$

$$0.766044443 = \frac{X}{20 \text{ ft}}$$

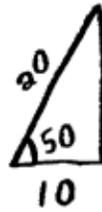
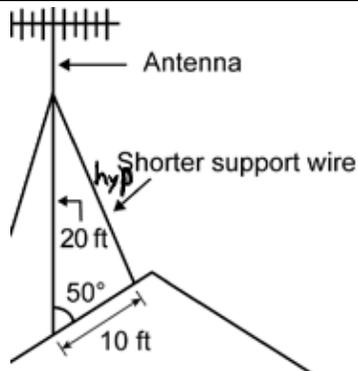
$$X = 15.3 \text{ ft}$$

Mark: 0 out of 2

Rationale: - Incorrect process
- Incorrect answer

Exemplar 2

(2 Marks)



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

$$64.29 \quad a^2 = 20^2 + 10^2 - 2(20)(10) \cos 50$$

$$a^2 = 400 + 100 - (400) \cos 50$$

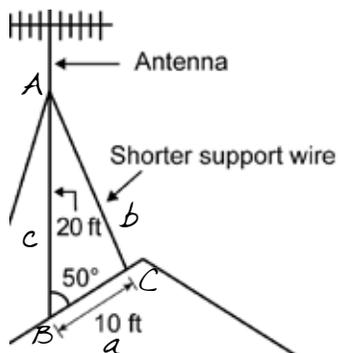
$$a = 64.29 \text{ ft}$$

Mark: 1 out of 2

Rationale: - Correct process (1 mark)
- Incorrect answer

Exemplar 3

(2 Marks)



$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$= 10^2 + 20^2 - 2(10)(20) \cos 50^\circ$$

$$= 100 + 400 - 400 \cos 50^\circ$$

$$= 64 \text{ ft}$$

$$\sqrt{64} = \sqrt{b^2}$$

$$b = 8$$

Mark: 1 out of 2

Rationale: - Correct process (1 mark)
- Incorrect answer

Question 21

(2 Marks)

The Sine Law is often used in construction, commercial, industrial, or artistic applications.

- A) Sketch a labelled picture or diagram (not necessarily to scale) that demonstrates where the Sine Law can be used in the real world. (1 mark)

Answer:

1 mark for sketch

- B) Explain how the Sine Law was used in your diagram. (1 mark)

Answer:

1 mark for explanation

Exemplar 1

(2 Marks)

A)



B)

When building roof supports
if you only know the sides and you
want to know the angle

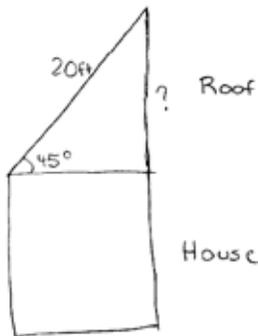
Mark: 0 out of 2

Rationale: - Incorrect sketch
- Incorrect explanation

Exemplar 2

(2 Marks)

A)



B)

1. Sine law is used in architecture
2. Sine Law is used when you have an angle, it's opposite side, and one other side, or if you have an angle, its opposite side, and one other side.

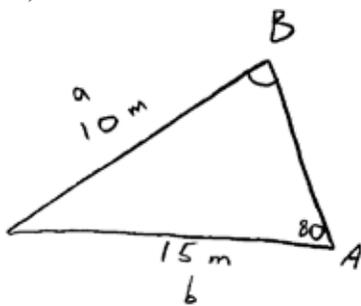
Mark: 0 out of 2

Rationale: - Incorrect sketch
- Incorrect explanation

Exemplar 3

(2 Marks)

A)



$$\frac{10}{\sin 80} = \frac{15}{\sin B}$$

B)

Building Plans

To determine the angle support beams
should be installed when you know the other
measurements like length of beam & length of
room (or space) and the other angle of where
the beam should go.

Mark: 2 out of 2

Rationale: - Correct sketch (1 mark)
- Correct explanation (1 mark)

Question 22

(2 Marks)

A regular polygon has central angles of 45° .

A) State the number of sides for this polygon. (1 mark)

Answer:

$$C = \frac{360^\circ}{n}$$

$$\frac{360^\circ}{n} = 45^\circ$$

$$n = 8 \qquad \leftarrow 1 \text{ mark}$$

B) State the name of this polygon. (1 mark)

Answer:

Octagon

Exemplar 1

(2 Marks)

A) 4

B) rhombus

Mark: 0 out of 2

Rationale: - Incorrect answer in Part A
- Incorrect response in Part B (not all rhombuses are regular polygons)

Exemplar 2

(2 Marks)

A) $\frac{180}{45} = 4$

B) square

Mark: 1 out of 2

Rationale: - Incorrect answer in Part A
- Correct response in Part B (follow-through error) (1 mark)

Exemplar 3

(2 Marks)

A)



B) octagon

Mark: 1 out of 2

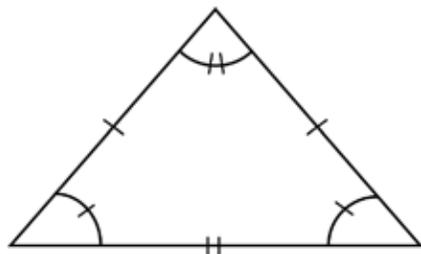
Rationale: - Incorrect answer in Part A
- Correct response in Part B (1 mark)

Question 23

(1 Mark)

Choose the letter that best completes the statement below.

The following triangle is:



- a) scalene
- b) equilateral
- c) isosceles
- d) right

Answer: c)

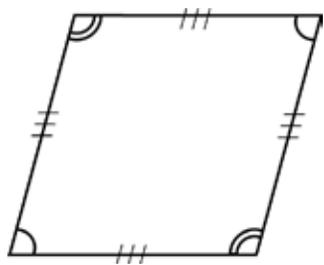


Question 24

(2 Marks)

Sketch a rhombus and label **all** of the congruent parts.

Answer:



1 mark for all sides labelled as congruent

1 mark for opposite angles labelled as congruent

Note to marker: Accept a properly labelled square.

(2 × 1 mark)

Exemplar 1

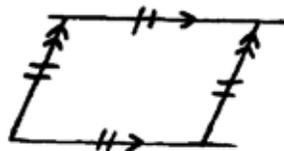
(2 Marks)

**Mark: 1 out of 2****Rationale:** - One correct answer (sides) (1 mark)**Exemplar 2**

(2 Marks)

**Mark: 1 out of 2****Rationale:** - One correct answer (angles) (1 mark)**Exemplar 3**

(2 Marks)

**Mark: 1 out of 2****Rationale:** - One correct answer (sides) (1 mark)

Question 25

(2 Marks)

Polygons are often used in construction, commercial, industrial, or artistic applications.

- Sketch a picture or diagram that demonstrates how properties of polygons are used in the real world. (1 mark)
- Support your diagram with an explanation of how the properties were used. (1 mark)

Answer:

1 mark for sketch

1 mark for explanation

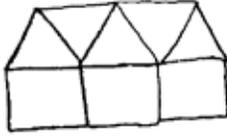
(2 × 1 mark)

Test Item and Marking Guide

Exemplar 1

(2 Marks)

A)

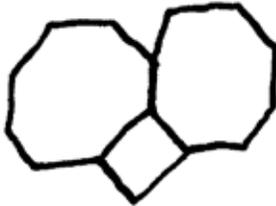


B) *Putting in floor tiles
each polygon could be used to fit
together so there are no spaces*

Mark: 2 out of 2**Rationale:** - Two correct responses (2 × 1 mark)**Exemplar 2**

(2 Marks)

A)

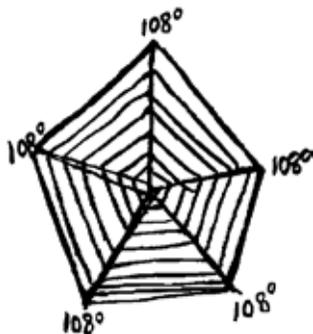


B) *When tiling a floor or wall you
must use polygons that have
vertices that add up to 360°
if you want the tiles to fit
nicely together.
ex) 2 regular octagons and a
square, $135 + 135 + 90 = 360$*

Mark: 2 out of 2**Rationale:** - Two correct responses (2 × 1 mark)**Exemplar 3**

(2 Marks)

A)



B) *If I'm building a gazebo that has
5 sides (pentagon) and need to know
what angle to cut the wood to meet at
each corner. I know each corner will be
108°.*

$$\frac{(5-2)180}{5}$$

5

$$\frac{(5-2) \times 180}{5} = 108^\circ$$

$$\frac{3 \times 180}{5}$$

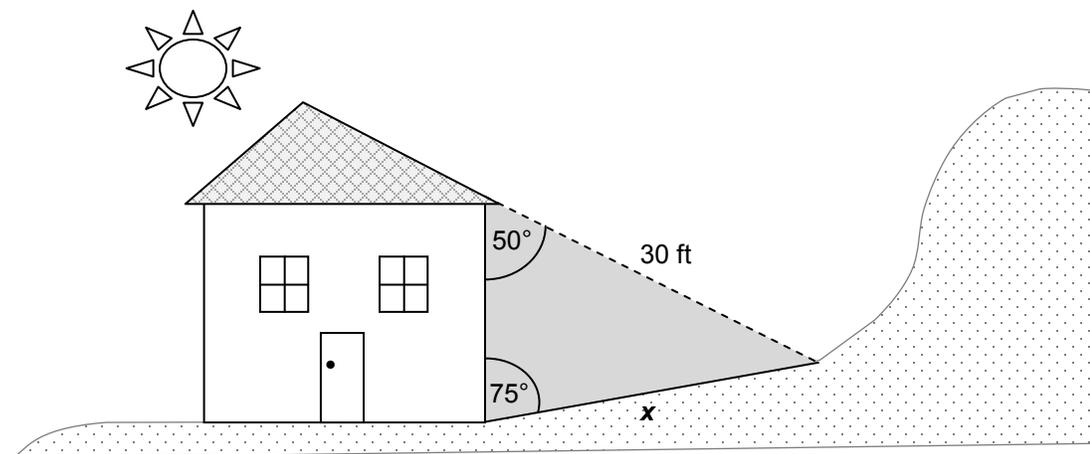
5

Mark: 2 out of 2**Rationale:** - Two correct responses (2 × 1 mark)

Question 26

(2 Marks)

A building is on the side of a hill. Calculate the length of shadow (x) the building will cast on the ground.



Answer:

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

$$\left. \begin{aligned} \frac{30}{\sin 75^\circ} &= \frac{x}{\sin 50^\circ} \\ x &= \frac{30 \times (\sin 50^\circ)}{\sin 75^\circ} \end{aligned} \right\} \leftarrow 1 \text{ mark for process}$$

$$x = 23.8 \text{ ft} \quad \leftarrow 1 \text{ mark}$$

Note to marker: Units are not required. Allow for appropriate roundings.

Exemplar 1

(2 Marks)

$$x = \sin 50^\circ \left(\frac{30}{\sin 75} \right)$$

$$x = 23.79$$

$$x = 23 \text{ feet}$$

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

(2 Marks)

$$\text{Sine law } \frac{\sin C}{c} = \frac{\sin B}{b}$$

$$\frac{\sin 50}{30 \text{ ft}} = \frac{\sin 75}{x}$$

$$= 37.8 \text{ ft}$$

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

(2 Marks)

$$\frac{75^\circ}{30} = \frac{50^\circ}{x}$$

$$50 \times 30 \div 75$$

$$= 23.8 \text{ FT}$$

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

Precision Measurement

Question 27

(2 Marks)

Cailyn works as a production engineer. She is working with a machine part that has a tolerance of 0.04 mm and a nominal value of 0.50 mm which is halfway between the maximum and minimum values. State the maximum and minimum values of the machine part.

Maximum: _____

Minimum: _____

Answer:

Maximum: 0.52 mm ← 1 mark

Minimum: 0.48 mm ← 1 mark

Note to marker: Units are not required.

Test Item and Marking Guide

Exemplar 1

(2 Marks)

Maximum: 0.50Minimum: 0.04**Mark: 0 out of 2****Rationale:** - Incorrect answer for maximum
- Incorrect answer for minimum**Exemplar 2**

(2 Marks)

*0.50 0.04*Maximum: 0.54 mmMinimum: 0.46**Mark: 1 out of 2****Rationale:** - Incorrect answer for maximum
- Correct answer (follow-through error) for minimum (1 mark)**Exemplar 3**

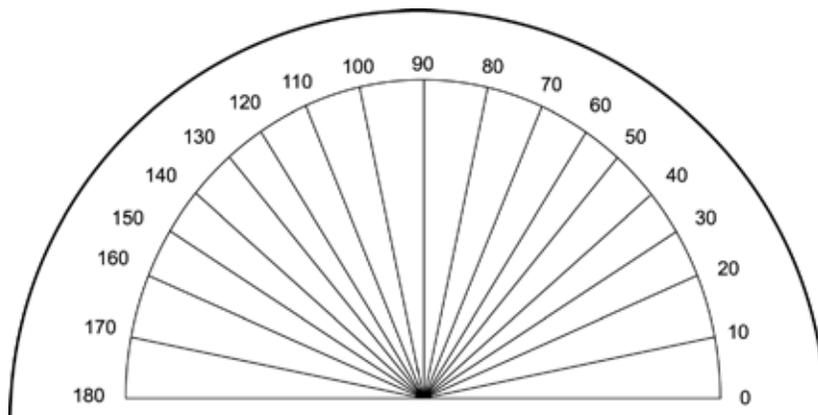
(2 Marks)

Maximum: *0.52*
*0.50 ± 0.02*Minimum: *0.50 ± 0.02*
*0.48***Mark: 2 out of 2****Rationale:** - Two correct answers (2×1 mark)

Question 28

(2 Marks)

State the precision and uncertainty of the protractor.



Precision: _____

Uncertainty: _____

Answer:

Precision: _____ 10° ← 1 mark

Uncertainty: _____ 5° ← 1 mark

Note to marker: Degrees are not required. Accept $\pm 5^\circ$.

Exemplar 1

(2 Marks)

Precision: 1°Uncertainty: 0.5°**Mark: 1 out of 2****Rationale:** - Incorrect answer for precision
- Correct answer (follow-through error) for uncertainty (1 mark)**Exemplar 2**

(2 Marks)

Precision: 90°Uncertainty: 45°**Mark: 1 out of 2****Rationale:** - Incorrect answer for precision
- Correct answer (follow-through error) for uncertainty (1 mark)**Exemplar 3**

(2 Marks)

Precision: 10°Uncertainty: ± 5°**Mark: 2 out of 2****Rationale:** - Correct answers (2 × 1 mark)

Question 29

(2 Marks)

Tolerance is often used in construction, commercial, industrial, or artistic applications.

- State a specific example where tolerance is used. (1 mark)
- Support your example with an explanation of how tolerance was required. (1 mark)

Answer:

1 mark for example

1 mark for explanation

Exemplar 1

(2 Marks)

when boring the cylinders in engine blocks you have to be precise to make sure the pistons fit properly there is a very small tolerance

Mark: 1 out of 2

Rationale: - Correct example (1 mark)
- Insufficient explanation

Exemplar 2

(2 Marks)

A baker would have to use tolerance when measuring ingredients for a cake, they would only be able to be off by a bit or their cake or baking wouldn't taste properly.

Mark: 2 out of 2

Rationale: - Correct example (1 mark)
- Correct explanation (1 mark)

Exemplar 3

(2 Marks)

- When people are measuring holes for putting in poles/street lights/bus stops.
- They check how much space they need to insert it in. If it's too big that's okay they can always fill it in but if it's too small then they have to fix it.

Mark: 2 out of 2

Rationale: - Correct example (1 mark)
- Correct explanation (1 mark)

Question 30

(1 Mark)

Chris owns a candy factory that specializes in making chocolate candies. Explain why Chris needs to be very accurate when measuring his ingredients.

Sample answers:

- *to help him determine his prices*
- *consistency (taste, texture, appearance, quality)*

Exemplar 1

(1 Mark)

He has to be accurate so he does not put too much or too little of an ingredient.

example: flour, sugar

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

(1 Mark)

because its probably a hard business to be in and he can't waste money on extra ingredients with fear of going broke.

he also would want the best tasting result for his customers.

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

(1 Mark)

Chris has to be very accurate because he doesn't want his candy too sweet but he also doesn't want them bitter, he also doesn't want to use more than needed because it will cost him more money.

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

Question 31

(1 Mark)

The maximum amount of stuffing that can fit in a pillow is 1500 grams. The tolerance is 100 grams. State the nominal value (which is halfway between the minimum and maximum values).

Answer:

1450 grams

Note to marker: Units are not required.

Test Item and Marking Guide

Exemplar 1

(1 Mark)

$$\begin{aligned}100/2 &= 50 \\1500 \text{ g} - 50 &= 1450 \text{ g} \\ \text{min} &= 1450 \text{ g} \\ \text{nominal value} &= 1450 - 50 \\ &= 1400 \text{ g}\end{aligned}$$

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

(1 Mark)

$$\begin{aligned}\text{max} &+1550 \\ &-1450\end{aligned}$$

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

(1 Mark)

$$1450 \text{ grams } (\pm 50) \text{ or } 1400 \text{ g } (+100)$$

Mark: 0 out of 1**Rationale:** - Incorrect answer (correct answer not clearly indicated)

Statistics

Question 32

(2 Marks)

Nicole is calculating her final mark in an Essential Mathematics course. Her projects are worth 45%, her tests are worth 35%, and her final exam is worth 20%.

Nicole earned

40% on her projects

60% on her tests

75% on her final exam

Calculate her final mark using a weighted mean.

Answer:

$$\left. \begin{array}{l} 40 \times 0.45 = 18 \text{ (projects)} \\ 60 \times 0.35 = 21 \text{ (tests)} \\ 75 \times 0.20 = 15 \text{ (final exam)} \end{array} \right\} \leftarrow 1 \text{ mark for process}$$

$$\begin{aligned} \text{Final mark: } & 18 + 21 + 15 \\ & = 54\% \quad \leftarrow 1 \text{ mark} \end{aligned}$$

Note to marker: Units are not required.

Exemplar 1

(2 Marks)

$$\frac{40 + 60 + 75}{3} = 58.3$$

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

(2 Marks)

$$\begin{aligned}40 \times 0.45 &= 18 \\60 \times 0.35 &= 21 \\75 \times 0.20 &= 15\end{aligned}$$

$$18 + 21 + 15 = 54$$

$$\frac{54}{3} = 18$$

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

(2 Marks)

$$\begin{aligned}45 \times 0.4 &= 18 \\35 \times 0.6 &= 21 \\75 \times 0.2 &= 15 \\ \hline &54\end{aligned}$$

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

Question 33

(2 Marks)

Explain the difference between Jill receiving 80% on a test and being in the 80th percentile for the same test.

Answer:

*80% is the percentage of questions that Jill answered correctly.
The 80th percentile is where Jill ranked in relation to the class.*

*1 mark for percentage
1 mark for percentile rank*

Test Item and Marking Guide

Exemplar 1

(2 Marks)

the difference is Jill got 80% but the other people in her class all might have better marks then her or lower marks

Mark: 0 out of 2

Rationale: - Incorrect response (percentage)
- Incorrect response (percentile rank)

Exemplar 2

(2 Marks)

If she got 80% on the test, she did fairly well but if she was in the 80th percentile, it doesn't necessarily mean she did well. It just means 20 people did better than she did but the highest score could have been something like 45%.

Mark: 1 out of 2

Rationale: - Correct response (percentage) (1 mark)
- Incorrect response (percentile rank)

Exemplar 3

(2 Marks)

Jill receiving 80% on a test means that out of the test she wrote, she got 80% percent of them right as an INDIVIDUAL.

80th percentile means that she did better than 80% of the class, but that doesn't mean the she necessarily got 80% – she could easily have gotten 49% while the 80% other than her got worse.

Mark: 2 out of 2

Rationale: - Two correct responses (2 × 1 mark)

Question 34

(3 Marks)

Using the following data:

63	47	88	91	76
41	51	74	76	83

A) State the mean. (1 mark)

Answer:

$$\begin{aligned} \text{Mean: } & \frac{690}{10} \\ & = 69 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

B) State the median. (1 mark)

Answer:

$$\begin{aligned} \text{Median: } & \frac{74 + 76}{2} \\ & = 75 \quad \leftarrow 1 \text{ mark} \end{aligned}$$

C) State the mode. (1 mark)

Answer:

$$\text{Mode: } 76 \quad \leftarrow 1 \text{ mark}$$

Exemplar 1

(3 Marks)

- A) $63 + 47 + 88 + 91 + 76 + 41 + 51 + 74 + 76 + 83 = 690$
- B) 41, 47, 51, 63, 74, 76, 76, 83, 88, 91
↑
- C) 76 is the mode because it occurs more

Mark: 1 out of 3

Rationale: - Incorrect answer in Part A
- Incorrect answer in Part B
- Correct answer in Part C (1 mark)

Exemplar 2

(3 Marks)

- A) 69
- B) 41 47 51 63 74 76 76 83 88 91
$$\frac{74 + 76}{2} = 112$$
- C) mode = 2

Mark: 1 out of 3

Rationale: - Correct answer in Part A (1 mark)
- Incorrect answer in Part B
- Incorrect answer in Part C

Question 35

(2 Marks)

The annual salaries for employees at Turnbull's manufacturing plant are:

Salary	\$12 000	\$29 000	\$36 000	\$40 000	\$ 55 000	\$80 000
Number of employees	10	8	7	8	5	2

Margaret, one of the employees, has an annual salary of \$36 000. Calculate her percentile rank.

Answer:

$$\left. \begin{aligned} PR &= \frac{b}{n} \times 100 \\ &= \frac{18}{40} \times 100 \end{aligned} \right\} \leftarrow 1 \text{ mark for process}$$
$$= 45$$

$\therefore 45$ or 45th or PR_{45} $\leftarrow 1$ mark

Exemplar 1

(2 Marks)

$$\frac{18}{40} \times 100 = 45\%$$

Mark: 1 out of 2**Rationale:** - Correct process (1 mark)
- Incorrect answer (%)**Exemplar 2**

(2 Marks)

$$\frac{6}{40} \times 100 = 15\text{th percentile}$$

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

(2 Marks)

$$\begin{aligned} \text{TOTAL} &= 40 \\ \text{ABOVE} &= 15 \\ \text{BELOW} &= 18 \end{aligned}$$

$$\frac{18}{40} = 45\text{TH PERCENTILE}$$

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

Appendix:

Irregularities in Provincial Tests

A Guide for Local Marking

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

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

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

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

Irregular Test Booklet Report

Test: _____

Date marked: _____

Booklet No.: _____

Problem(s) noted: _____

Question(s) affected: _____

Action taken or rationale for assigning marks: _____

Follow-up: _____

Decision: _____

Marker's Signature: _____

Principal's Signature: _____

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