Grade 12
Essential Mathematics
Achievement Test

Marking Guide

June 2024

Manitoba

Grade 12 Essential Mathematics Achievement Test:
Marking Guide (June 2024)

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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.

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General Marking Instructions

The *Grade 12 Essential Mathematics Achievement Test: Marking Guide (June 2024)* 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.

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	=	55/76
	Preliminary Mark Note préliminaire		Communication Errors (maximum 3 marks) Erreurs de communication (maximum 3 points)		

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 the simple Cosine ratio when the question called for the use of the Cosine Law)

Additional-information errors

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

Irregularities in Provincial Tests

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

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

Assistance

If any issue arises that cannot be resolved locally during marking, please call Manitoba Education and 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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Home Finance

Question 1 E6.H.1 1 mark

Choose the letter that best completes the following statement.

An ongoing cost associated with home ownership is the

A) land survey

B) property tax adjustment

C) home insurance premium

D) land transfer tax

Answer: C

Question 2 E6.H.1 2 marks

Calculate the annual home insurance premium, before taxes, for the following situation:

- Value of home: $185 000
- Area 3
- Comprehensive policy
- $200 deductible

Use the *Manitoba Homeowner's Insurance Rates* table on the following page.

Show your work.

Answer:

Rate = $734 ← 1 mark

Annual premium $= 734 \times 1.10$

$= \$807.40$ ← 1 mark

Note to marker: Award one mark to a student that indicates the correct rate in the given table. This is considered to be equivalent to writing the correct value in the space provided.

Manitoba Homeowner's Insurance Rates

Manitoba Homeowner's Insurance Rates ($500 deductible)								
	Winnipeg		Area 2		Area 3		Area 4	
Amount	Standard	Comprehensive	Standard	Comprehensive	Standard	Comprehensive	Standard	Comprehensive
$ 50 000	195	214	147	161	196	216	261	287
$ 55 000	216	238	160	176	217	239	289	318
$ 60 000	237	260	173	190	237	261	315	347
$ 65 000	252	277	187	205	255	281	339	373
$ 70 000	266	303	200	220	270	297	359	395
$ 75 000	294	314	210	231	285	314	379	417
$ 80 000	310	323	221	243	302	332	402	438
$ 85 000	318	333	226	249	313	344	416	462
$ 90 000	324	349	231	254	324	356	431	474
$ 95 000	348	370	244	268	345	380	459	505
$100 000	364	393	260	286	361	397	480	528
$105 000	390	417	278	306	378	416	503	553
$110 000	402	441	293	322	393	432	523	575
$115 000	418	464	299	329	409	450	544	598
$120 000	436	487	309	340	424	466	564	620
$125 000	451	510	319	351	444	488	591	650
$130 000	472	543	339	373	466	513	620	682
$135 000	498	557	345	380	477	525	634	697
$140 000	523	580	358	394	496	546	660	726
$145 000	538	596	375	413	508	559	676	744
$150 000	550	604	385	424	520	572	692	761
$155 000	557	613	398	438	551	606	733	806
$160 000	565	622	413	454	569	626	757	833
$165 000	572	629	425	468	589	648	783	861
$170 000	590	647	441	485	609	670	810	891
$175 000	607	668	451	496	624	686	830	913
$180 000	620	686	466	513	648	713	862	948
$185 000	636	702	478	526	667	734	887	976
$190 000	652	717	492	541	705	776	938	1032
$195 000	678	742	504	554	720	792	958	1054
$200 000	692	771	519	571	726	799	966	1063
Additional Amounts per $1000 coverage	Add: $3.15	Add: $3.50	Add: $2.75	Add: $3.03	Add: $3.55	Add: $3.91	Add: $4.72	Add: $5.19

$200 deductible—Increase premium by 10%

Manitoba no longer charges sales tax on home insurance premiums.

Exemplar 1

185 000 x .734

$135790

0 out of 2

- Incorrect rate
- Incorrect final answer

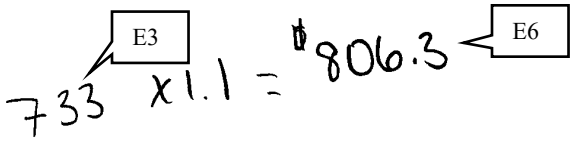
Exemplar 2

332 x 1.1 = $365.20

1 out of 2

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

Exemplar 3



624	686	830
648	713	862
667	(734)	887
705	776	938
720	792	958
726	799	966
Add: $3.55	Add: $3.91	Add: $4.72

2 out of 2

- Correct rate (1 mark)
- Correct final answer (follow-through error) (1 mark)
- E3 (makes a transcription error)
- E6 (does not express the answer to the appropriate number of decimal places)

Exemplar 4

annual premium = 734 X .10 = 73.40

734 + 73.40 = $807.40 x 1.12

= $904.29

1 out of 2

- Correct rate (1 mark)
- Incorrect final answer (incorrect application of taxes)

Question 3 E6.H.1 1 mark

Describe one energy efficient option that will reduce a homeowner's energy bill.

Sample Answers:

- add insulation to the attic
- purchase high efficiency appliances
- install new windows
- install weather stripping around doors

Exemplar 1

A wood-burning stove to heat the house to reduce electricity costs.

0 out of 1

- Incorrect response (a wood-burning stove is not an energy-efficient option even though it may reduce natural gas or electric heating costs)

Exemplar 2

- lights

0.5 out of 1

- Correct response (1 mark)
- Lack of clarity (what about the lights?) (0.5 mark deduction)

Exemplar 3

An efficient energy upgrade is solar panels.

1 out of 1

- Correct response (1 mark)

Exemplar 4

Programable thermostat

1 out of 1

- Correct response (1 mark)

Question 4 E6.H.1 2 marks

Michael is purchasing a property valued at $245 000. The table below shows the land transfer tax to be paid for the first $200 000.

Land Transfer Tax Table		
Value of Property	**Rate**	**Tax Amount**
On the first $30 000	0%	$0
On the next $60 000 (i.e., $30 001 to $90 000)	0.5%	$300
On the next $60 000 (i.e., $90 001 to $150 000)	1.0%	$600
On the next $50 000 (i.e., $150 001 to $200 000)	1.5%	$750
On amounts in excess of $200 000	2.0%	
Total Land Transfer Tax Due		

Calculate the total land transfer tax due for this property.

Show your work.

Answer:

Tax amount in excess of $200 000 $= 45\,000 \times 0.02$

$= \$900$ ← 1 mark

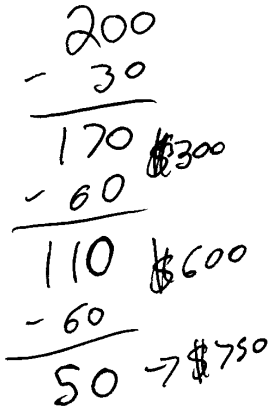
Total land transfer tax due $= 0 + 300 + 600 + 750 + 900$

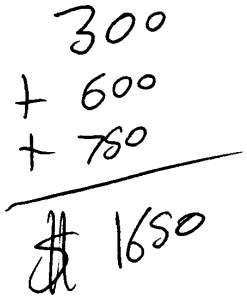
$= \$2550$ ← 1 mark

Note to marker: Accept answers in or out of provided boxes.

Exemplar 1

Land Transfer Tax Table		
Value of Property	**Rate**	**Tax Amount**
On the first $30 000	0%	$0
On the next $60 000 (i.e., $30 001 to $90 000)	0.5%	$300
On the next $60 000 (i.e., $90 001 to $150 000)	1.0%	$600
On the next $50 000 (i.e., $150 001 to $200 000)	1.5%	$750
On amounts in excess of $200 000	2.0%	
Total Land Transfer Tax Due		$1650





1 out of 2

- No calculation of tax amount in excess of $200 000
- Correct final answer (follow-through error) (1 mark)

Exemplar 2

TOTAL LAND TRANSFER TAX = $245,000 - $200.000 × .02
= $900

1 out of 2

- Correct tax amount in excess of $200 000 (1 mark)
- Incorrect final answer

Exemplar 3

200000 × 0.2
= 4000.00

$5650.00

1 out of 2

- Incorrect tax amount in excess of $200 000
- Correct final answer (follow-through error) (1 mark)

Question 5 E6.H.1 1 mark

Choose the letter that best completes the following statement.

One advantage of purchasing a house rather than renting a similar house is that

A) homeowners need a smaller down payment than tenants

B) homeowners pay less for home insurance than tenants

C) homeowners have more freedom to relocate than tenants

D) homeowners have more freedom to renovate than tenants

Answer: D

Question 6 E6.H.1 2 marks

A couple is buying a house for $297 000. They make a $30 000 down payment and obtain a mortgage for the remaining amount. The monthly amortization rate is $10.11 per thousand dollars borrowed.

Calculate their monthly mortgage payment.

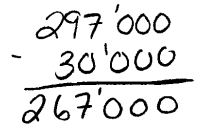
Show your work.

Answer:

$$\begin{aligned} \text{Mortgage amount} &= 297\ 000 - 30\ 000 \\ &= \$267\ 000 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

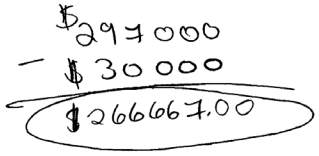
$$\begin{aligned} \text{Mortgage payment} &= 267\ 000 \times \frac{10.11}{1000} \\ &= \$2699.37 \qquad \leftarrow 1 \text{ mark} \end{aligned}$$

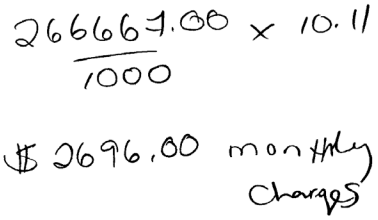
Exemplar 1



1 out of 2
- Correct mortgage amount (1 mark)

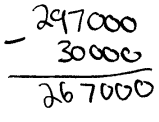
Exemplar 2

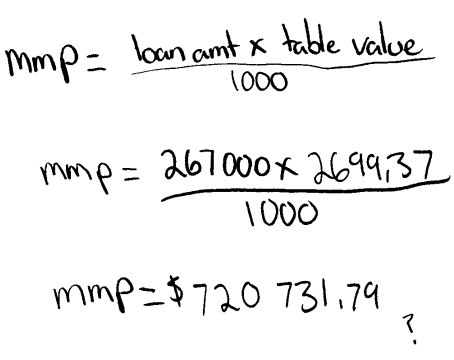


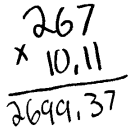


1 out of 2
- Incorrect mortgage amount
- Correct final answer (follow-through error) (1 mark)

Exemplar 3







1 out of 2
- Correct mortgage amount (1 mark)
- Incorrect final answer

Question 7 E6.H.1 1 mark

Describe one way to reduce the amount of interest paid over the life of a mortgage.

Sample Answers:

- reduce the amortization period
- make more frequent payments (example: biweekly rather than monthly)
- obtain a lower interest rate
- increase the down payment (less money is borrowed)
- make a lump sum payment on the principal

Exemplar 1

Increase the year span

(for example: 10 years to 25 years)

0 out of 1
- Incorrect response

Exemplar 2

Pay more to reduce amount owed that they are taxing.

0 out of 1
- Incorrect response

Exemplar 3

- choose the 5 year loan

0.5 out of 1
- Correct response (1 mark)
- Lack of clarity (5 years compared to what?) (0.5 mark deduction)

Exemplar 4

have a short mortgage life Period

ex) 25 yrs instead get 20 yrs

1 out of 1
- Correct response (1 mark)

Question 8 E6.H.1 3 marks

The monthly mortgage payment for a house is \$1846, the annual property taxes are \$2800, the monthly heating cost is \$180, and the gross monthly income of the purchasers is \$6000.

Calculate the Gross Debt Service Ratio.

Show your work.

Answer:

$$\text{Monthly property taxes} = 2800 \div 12$$
$$= \$233.33$$

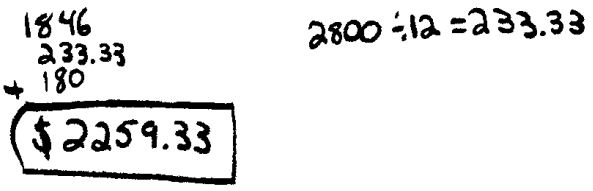
$$GDSR = \frac{\left(\begin{array}{c}\text{Monthly}\\ \text{mortgage}\\ \text{payment}\end{array} + \begin{array}{c}\text{Monthly}\\ \text{property}\\ \text{taxes}\end{array} + \begin{array}{c}\text{Monthly}\\ \text{heating}\\ \text{costs}\end{array}\right)}{\text{Gross monthly income}}$$

$$= \frac{(1846 + 233.33 + 180)}{6000}$$

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

$$= \frac{2259.33}{6000}$$
$$= 0.376\,55\ldots$$
$$= 0.38 \quad \text{or} \quad 37.66\% \quad \leftarrow 1 \text{ mark}$$

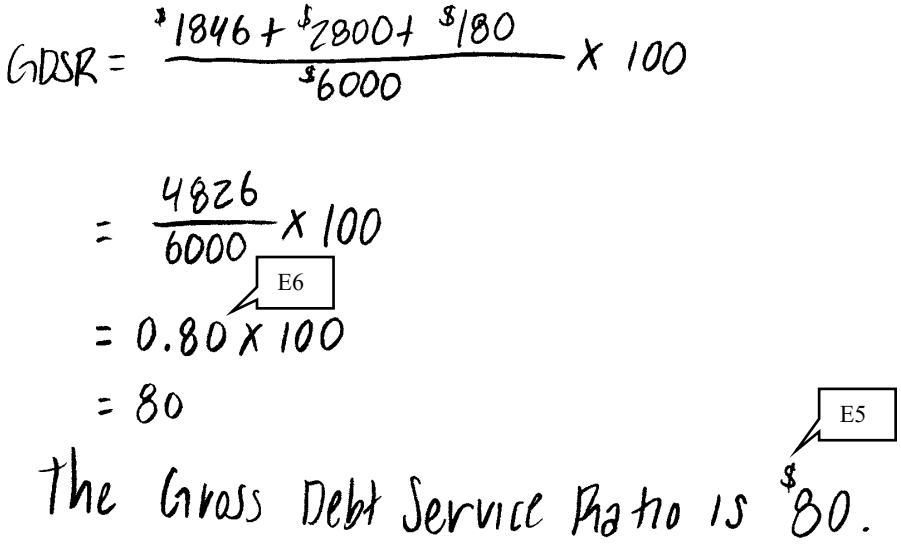
Exemplar 1



1 out of 3

- Three correct substitutions (1 mark)
- Incorrect final answer

Exemplar 2



2 out of 3

- Three correct substitutions (1 mark)
- Correct final answer (follow-through error) (1 mark)
- E5 (uses incorrect units of measure)
- E6 (rounds too soon)

Exemplar 3

$$\frac{1846 + 233.33 + 180}{6000}$$

$$= 2079.36$$

2 out of 3

- All correct substitutions (2 marks)
- Incorrect final answer

Exemplar 4

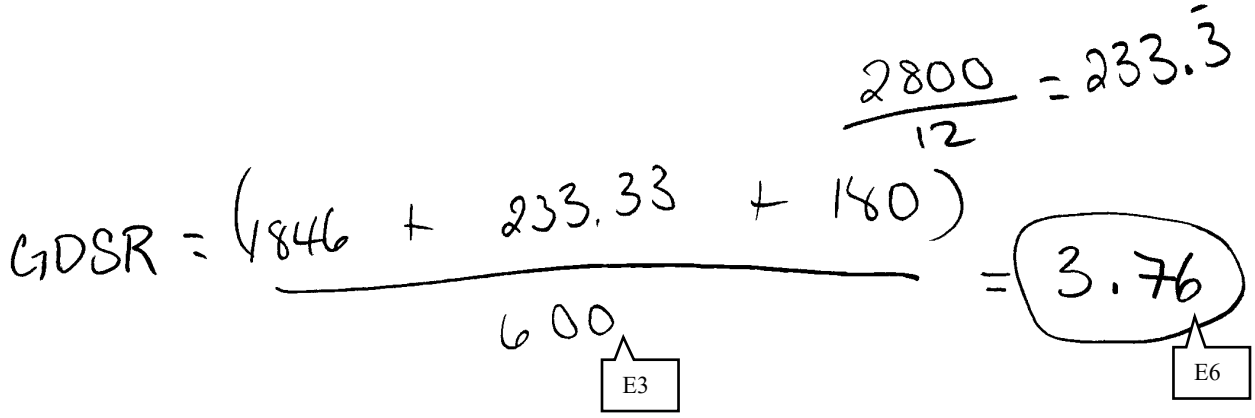
$$\left(\frac{(1846 + 233.33 + 180)}{6000}\right) = 0.38$$

GDSR = 0.38%

2 out of 3

- All correct substitutions (2 marks)
- Incorrect final answer (incorrect application of percent symbol)

Exemplar 5



3 out of 3

- All correct substitutions (2 marks)
- Correct final answer (follow-through error) (1 mark)
- E3 (makes a transcription error)
- E6 (rounds incorrectly)

Question 9 E6.H.1 3 marks

Calculate the total amount of property tax to be paid for the following situation:

Portioned assessment	$182 000
Municipal mill rate	13.2 mills
Education taxes	$2145
Frontage	110 ft.
Local improvement cost	$4.05/ft.
Property tax credit	$700

Show your work.

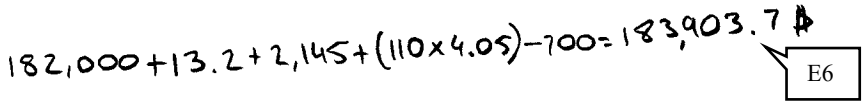
Answer:

$$\text{Municipal tax} = 182\ 000 \times \frac{13.2}{1000}$$
$$= \$2402.40 \quad \leftarrow 1 \text{ mark}$$

$$\text{Local improvement cost} = 110 \times 4.05$$
$$= \$445.50 \quad \leftarrow 1 \text{ mark}$$

$$\text{Total property tax} = 2402.40 + 2145 + 445.50 - 700$$
$$= \$4292.90 \quad \leftarrow 1 \text{ mark}$$

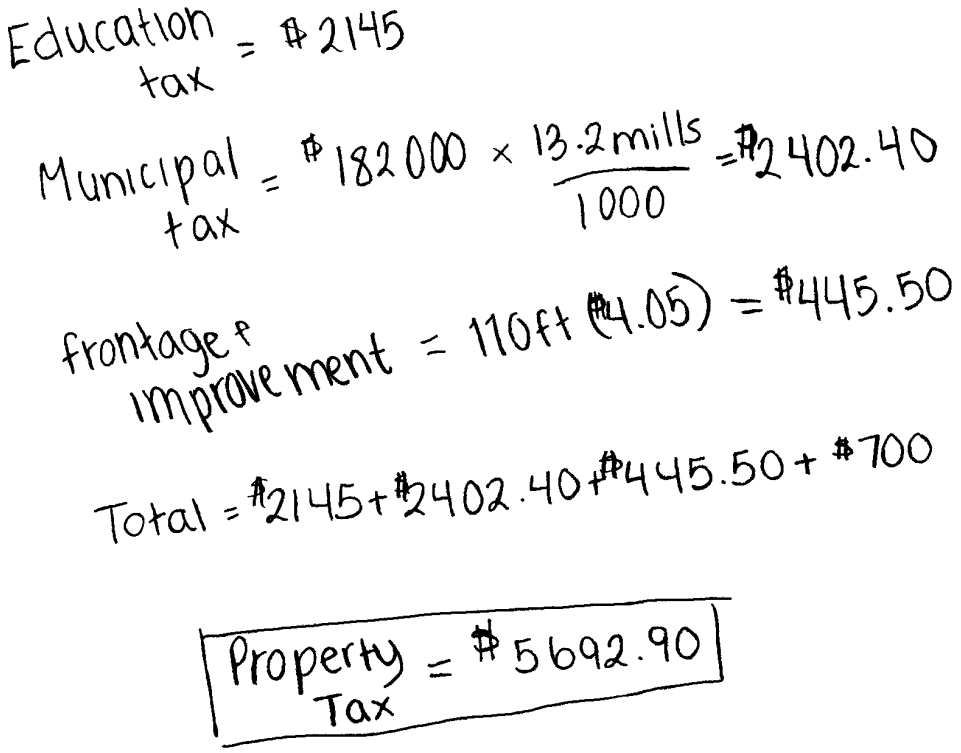
Exemplar 1



2 out of 3

- Incorrect municipal tax
- Correct local improvement cost (1 mark)
- Correct total property tax (follow-through error) (1 mark)
- E6 (does not express the answer to the appropriate number of decimal places)

Exemplar 2



2 out of 3

- Correct municipal tax (1 mark)
- Correct local improvement cost (1 mark)
- Incorrect total property tax

Exemplar 3

$\frac{\$2000 \times 13.2}{1000} = 2402.40$

$2402.40 + 2145 + (4.05 \times 110)$

$= \$4992.90$

2 out of 3

- Correct municipal tax (1 mark)
- Correct local improvement cost (1 mark)
- Incorrect total property tax

Precision Measurement

Note: Do not round answers in this unit.

Question 10 E5.P.1 1 mark

Janalee is baking a cake. Before measuring the ingredients, she notices that her scale is not correctly calibrated.

Choose the letter that best completes the statement below.

The aspect of measurement most affected is

A) accuracy

B) precision

C) tolerance

D) uncertainty

Answer: A

Question 11 E5.P.1 1 mark

State the precision of the clock shown below.

Answer:

1 minute or $\frac{1}{60}$ hour

Exemplar 1

Precision=1

0 out of 1

- Incorrect answer

Exemplar 2

$\frac{1}{5}$ hrs

0 out of 1

- Incorrect answer

Question 12 E5.P.1 2 marks

The thermometer of Genevieve's oven has a precision of 5°F.

A) State the uncertainty of the thermometer. (1 mark)

Answer:

Uncertainty $= 5 \div 2$

$= \pm 2.5°F$ ←1 mark (± not required)

B) Genevieve needs to preheat her oven to 375°F.

State the maximum possible temperature of the oven at this setting. (1 mark)

Answer:

Maximum temperature $= 375 + 2.5$

$= 377.5°F$ ←1 mark

Exemplar 1

A) 2.5 ± E5

B) 373.5 °F

1 out of 2
- Correct answer in Part A (1 mark)
- Incorrect answer in Part B
- E5 (does not include units in final answer)

Exemplar 2

A) $\frac{P}{5}$ ± 2.5 un E5

B) The maximum temperature the oven will reach is 375°F, as that what it is set to.

1 out of 2
- Correct answer in Part A (1 mark)
- Incorrect answer in Part B
- E5 (does not include units in final answer)

Exemplar 3

A) 0.5 °F

B) 375.5 °F

1 out of 2
- Incorrect answer in Part A
- Correct answer in Part B (follow-through error) (1 mark)

Question 13 E5.P.1 3 marks

A) State the minimum value of $8 \text{ ft.} \pm 0.5 \text{ ft.}$ (1 mark)

Answer:

7.5 ft.

B) State the maximum value of $30 \text{ cm} \, {}^{+0 \text{ cm}}_{-1 \text{ cm}}$. (1 mark)

Answer:

30 cm

C) State the nominal value as a midpoint of $\begin{matrix} 19.5 \text{ in.} \\ 17.5 \text{ in.} \end{matrix}$. (1 mark)

Answer:

18.5 in.

Exemplar 1

A) minimum value: 0,5 ft

B) maximum value: 30cm

C) nominal value as a midpoint: 18,5 in

2 out of 3

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

Exemplar 2

8 - 0.5

A) minimum value: 7.5ft.

30+0

B) maximum value: 30cm

19.5+17.5÷2

C) nominal value as a midpoint: 28.25 in.

2 out of 3

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

Exemplar 3

A) minimum value: 7.5 E5

B) maximum value: 30 E5

C) nominal value as a midpoint: 18.5 ± 1

19.5 + 17.5
= 18.5

2 out of 3

- Correct answer in Part A (1 mark)
- Correct answer in Part B (1 mark)
- Incorrect answer in Part C
- E5 (does not include units in final answer)

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Question 14 E5.P.1 1 mark

State the range of acceptable measurements for the following form of tolerance.

$$2.6 \text{ mm } {}^{+0.3 \text{ mm}}_{-0.2 \text{ mm}}$$

Answer:

2.4 mm to 2.9 mm or 0.5 mm

Exemplar 1

+ 2.9 mm

-2.4 mm

0 out of 1
- Incorrect answer

Exemplar 2

2.4mm - 2.9mm = -0.5 mm

0 out of 1
- Incorrect answer

Exemplar 3

2.9m or 2.4 mm

0 out of 1
- Incorrect answer

Exemplar 4

max: 2.9 mm

min: 2.4 mm

1 out of 1
- Correct answer (1 mark)

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Question 15 E5.P.1 1 mark

Choose the letter that best completes the statement below.

When given a measurement in the form "nominal value $\pm\frac{1}{2}$ tolerance", the measurement must never be

A) less than the nominal value

B) greater than the nominal value

C) less than the maximum

D) greater than the maximum

Answer: D

Vehicle Finance

Question 16 E5.V.1 1 mark

Ricardo needs to get a new vehicle. He drives long distances for work and family activities.

Justify why Ricardo should buy rather than lease a vehicle based on this information.

Sample Answer:

Ricardo should buy a vehicle because, when leasing, there is a fee for exceeding the limit on kilometres.

Exemplar 1

buy because hes going to be driving a lot.

0.5 out of 1
- Correct response
- Lack of clarity (driving a lot?) (0.5 mark deduction)

Exemplar 2

He should lease it because he drives long distances so it makes more sense to pay lower monthly payments if he's putting lots of mileage on it. He won't want to own a car with so much mileage.

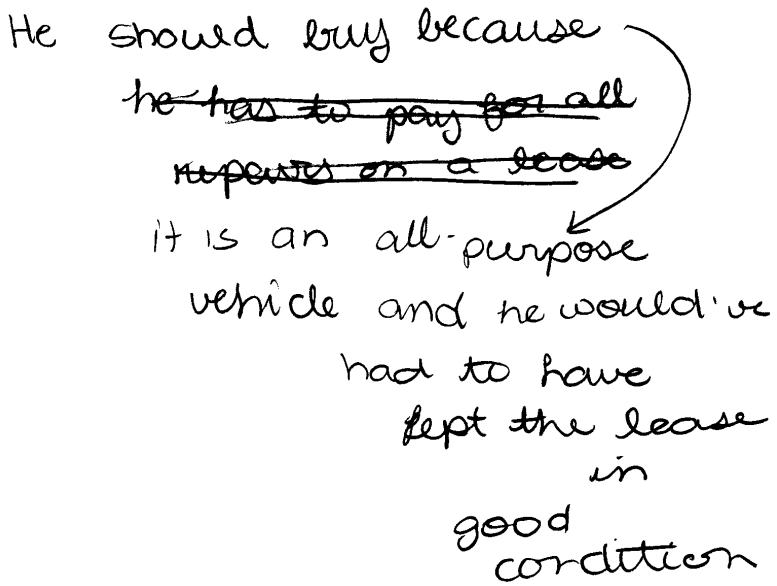
0 out of 1
- Incorrect response

Exemplar 3

Ricardo should buy a vehicle because it would come out cheaper then leasing a vehicle

0 out of 1
- Incorrect response

Exemplar 4



0 out of 1

- Incorrect response

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Question 17 E5.V.1 2 marks

Jen is buying a new vehicle from a dealership for $26 400. The dealership has agreed to accept Jen's old vehicle with a trade-in value of $7400.

Calculate the amount she will pay for the new vehicle, after taxes.

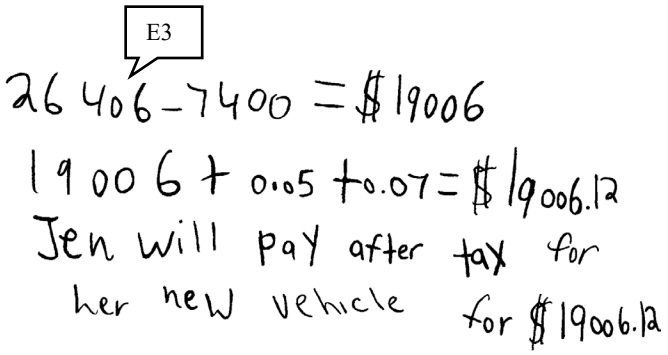
Show your work.

Answer:

$$\text{Pre-tax amount} = 26\,400 - 7400$$
$$= \$19\,000 \quad \leftarrow 1 \text{ mark}$$

$$\text{Amount after taxes} = 19\,000 \times 1.12$$
$$= \$21\,280 \quad \leftarrow 1 \text{ mark}$$

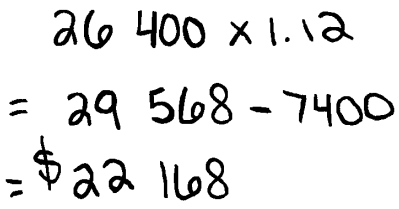
Exemplar 1



1 out of 2

- Correct subtraction of down payment (1 mark)
- Incorrect taxes
- E3 (makes a transcription error)

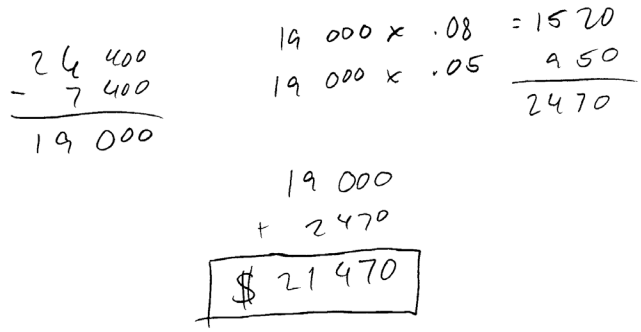
Exemplar 2



1 out of 2

- Incorrect application of taxes
- Correct subtraction of down payment (1 mark)

Exemplar 3



1 out of 2

- Correct subtraction of down payment (1 mark)
- Incorrect taxes

Question 18 E5.V.1 2 marks

Jacques is buying a used car privately for $16 500. The book value of the car is $15 400.

Calculate the amount Jacques will pay for the car, after taxes.

Show your work.

Answer:

$$\text{PST on purchase price} = 16\,500 \times 0.07$$
$$= \$1155 \quad \leftarrow 1 \text{ mark}$$

$$\text{Amount after taxes} = 16\,500 + 1155$$
$$= \$17\,655 \quad \leftarrow 1 \text{ mark}$$

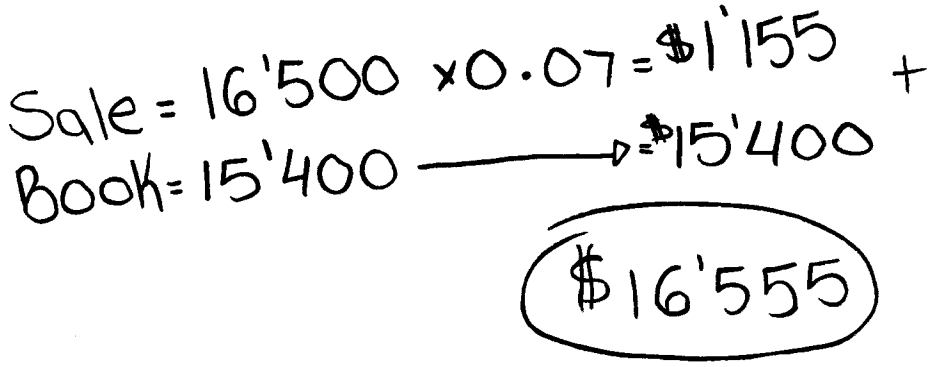
Note to marker: Award one mark for a follow-through error only if the PST is added to $16 500.

Exemplar 1

1 out of 2

- Incorrect PST
- Correct amount after taxes (follow-through error) (1 mark)

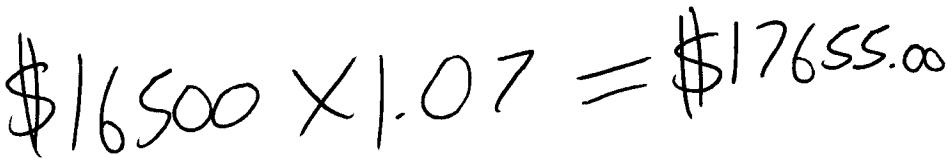
Exemplar 2



1 out of 2

- Correct PST (1 mark)
- Incorrect amount after taxes

Exemplar 3



2 out of 2

- Correct PST (1 mark)
- Correct amount after taxes (1 mark)

Question 19 E5.V.1 1 mark

Paula states the following:

> "If you are involved in an accident, your car insurance premium and/or driver's license costs will increase."

Explain whether Paula is correct.

Sample Answers:

- Paula is correct only if you are at fault for the accident.
- Paula is incorrect because these costs only increase if you are at fault.

Exemplar 1

It depends on the circumstances. If you are at fault for the accident they will go up more than if you aren't. But typically they will go up.

0 out of 1

- Incorrect response

Exemplar 2

Yes because demerts will be added to your licences

0 out of 1

- Incorrect response

Exemplar 3

yes paula is correct the more accidents you are involed in the more you will have to pay for a licence every year because you have to prove you are capable of driving again and when you get in a lot of accidents you get damarits and the more you get the more it goes down and you pay more aswell.

0.5 out of 1

- Correct response (1 mark)
- Lack of clarity (… if you are at fault) (0.5 mark deduction)

Exemplar 4

That is only correct if someone makes a claim to the insurance company about the accident, if no one does then the costs would not increase.

1 out of 1

- Correct response (1 mark)

Question 20 E5.V.1 3 marks

Suni takes his car to a garage for repairs. The details of the work done are shown below:

Parts:		Labour:
Fan belt	$85	3.25 hours at $95 per hour
Radiator	$158	

Calculate the total amount Suni will pay for these repairs, after taxes.

Show your work.

Answer:

$$\text{Parts} = 85 + 158$$
$$= \$243$$

$$\text{Labour} = 3.25 \times 95$$
$$= \$308.75 \quad \leftarrow 1 \text{ mark}$$

$$\text{Subtotal} = 308.75 + 243$$
$$= \$551.75 \quad \leftarrow 1 \text{ mark}$$

$$\text{Total amount} = 551.75 \times 1.12$$
$$= \$617.96 \quad \leftarrow 1 \text{ mark}$$

OR

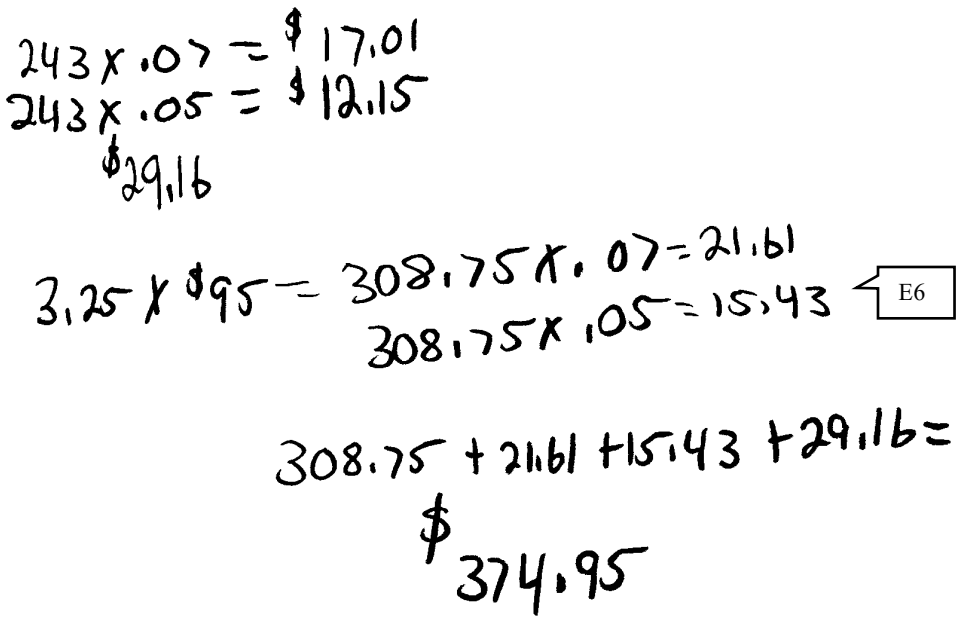
Answer:

$$\text{Total parts cost} = (85 + 158) \times 1.12$$
$$= \$272.16 \quad \leftarrow 1 \text{ mark}$$

$$\text{Total labour cost} = 3.25 \times 95 \times 1.12$$
$$= \$345.80 \quad \leftarrow 1 \text{ mark}$$

$$\text{Total amount} = \$272.16 + \$345.80$$
$$= \$617.96 \quad \leftarrow 1 \text{ mark}$$

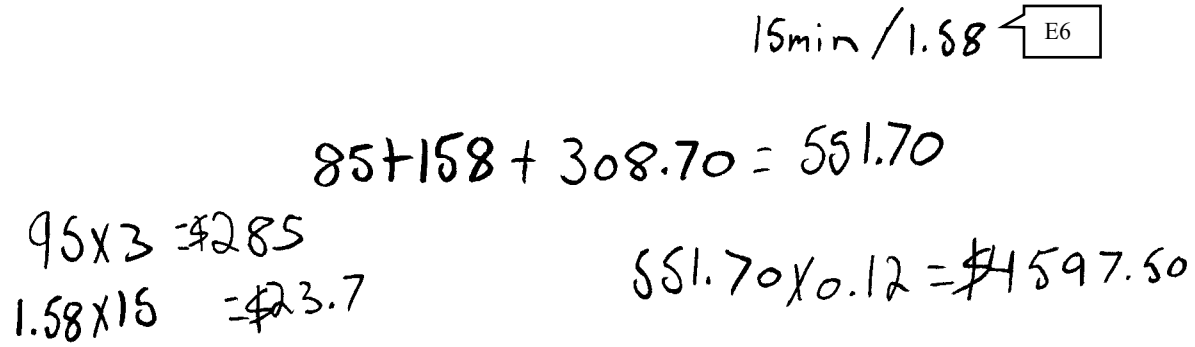
Exemplar 1



2 out of 3

- Correct labour (1 mark)
- Incorrect subtotal
- Correct total amount (follow-through error) (1 mark)
- E6 (rounds incorrectly)

Exemplar 2



2 out of 3

- Correct labour (calculated pay per minute) (1 mark)
- Correct subtotal (1 mark)
- Incorrect total amount
- E6 (rounds too soon)

Exemplar 3

$85\ (1.12) = 95.2$

$158\ (1.12) = 176.96$

$3.25(95)(1.12) = 345.8$

$95.2 + 176.96 + 345.8 = \$617.96$

3 out of 3

- Correct labour (1 mark)
- Correct subtotal (1 mark)
- Correct total amount (1 mark)

Question 21 E5.V.1 3 marks

Nick owns a hybrid vehicle. The fuel economy of his vehicle is 4.6 L/100 km.

A) Calculate the amount of fuel Nick's vehicle will use if he plans to travel 2475 km during his summer vacation. (2 marks)

Show your work.

Answer:

$$\frac{\text{L}}{100\text{ km}} = \frac{\text{Fuel used in litres}}{\text{Distance travelled in km}}$$

$$\left.\begin{aligned}\frac{4.6\text{ L}}{100\text{ km}} &= \frac{x}{2475\text{ km}} \\ x &= \frac{2475\text{ km} \times 4.6\text{ L}}{100\text{ km}}\end{aligned}\right\} \leftarrow \text{1 mark for process}$$

$$= 113.85\text{ L} \qquad \leftarrow \text{1 mark}$$

B) Nick spends $182.17 on fuel while on vacation.

Calculate the cost of fuel per litre. (1 mark)

Answer:

$$\text{Cost of fuel} = \frac{182.17}{113.85}$$

$$= \$1.60/\text{L} \qquad \leftarrow \text{1 mark}$$

or

$$= 160.0¢/\text{L}$$

Exemplar 1

A) $\frac{4.6 \times 100}{2475}$

$= 0.185 \times 100$

$= 18.58\ L$

B) $182.17 \div 18.58$

$= \$9.80$

E5

1 out of 3

- Incorrect process in Part A
- Incorrect fuel amount in Part A
- Correct answer in Part B (follow-through error) (1 mark)
- E5 (missing units of measure)

Exemplar 2

A) $\frac{4.6}{100}$ 2475

4.6×2475

$= 11385 \div 100 = 113.85L$ / 2475

E5

B) $\frac{182.17}{113.85} = \$1.60/L$

3 out of 3

- Correct process in Part A (1 mark)
- Correct fuel amount in Part A (1 mark)
- Correct answer in Part B (1 mark)
- E5 (missing units of measure)

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Question 22 E5.V.1 4 marks

Sadie is leasing a vehicle for $179 per month, after taxes. The term of the lease is for three years, and Sadie must pay $2100 at the time of signing the lease.

A) Calculate the total amount Sadie will have paid to lease the vehicle after three years. (2 marks)

Show your work.

Answer:

Total lease payments $= 179 \times 12 \times 3$

$= \$6444$ ← 1 mark

Total paid after three years $= 6444 + 2100$

$= \$8544$ ← 1 mark

B) Sadie decides to buy the vehicle at the end of her lease. The buyout price is $8000, after taxes.

State the total amount that Sadie paid to lease, and now buy this vehicle. (1 mark)

Answer:

Total amount $= 8544 + 8000$

$= \$16\ 544$ ← 1 mark

C) The original purchase price of the vehicle was $15 000, after taxes.

Justify whether Sadie made a good decision to lease, and then buy this vehicle. (1 mark)

Sample Answers:

- No, Sadie did not make a good decision because she paid more overall.
- Yes, Sadie made a good decision because monthly lease payments were lower, making it more affordable monthly.
- Yes, Sadie made a good decision because it gave her the option to return the vehicle.

Exemplar 1

A) 179 X 60 = 10 740 + 2100 = $12840

B) 8000 + 12840 = $20840

C) 15000 X 1.12 = $16800
She could have just bought it

2 out of 4
- Incorrect lease payments in Part A
- Correct total amount in Part A (follow-through error) (1 mark)
- Correct answer in Part B (follow-through error) (1 mark)
- Incorrect justification in Part C

Exemplar 2

A) 179 x 1·12 = 200·48

200·48 x 12 x 3 = 7 217·28 + 2100
= $9317·28

B) $8000 + 9317·28 = $17 317·28

C) Sadie didn't made a good decision because she payed $17 317·28 which is $2 317·28 more than purchasing the vehicle for $15 000. she just let herself pay more.

3 out of 4
- Incorrect lease payments in Part A (incorrect application of taxes)
- Correct total amount in Part A (follow-through error) (1 mark)
- Correct answer in Part B (follow-through error) (1 mark)
- Correct justification in Part C (1 mark)

Exemplar 3

A) 179×1.12

$= \$200.48$

$= 200.48 \times 12 \times 3 + 2100$

$= \$9317.28$

B) 8000×1.12

$= 8960$

9317.28

$+ 8960$

$\$18277.28$

C) $15{,}000 \times 1.12$

$= 16800$

18277.28

$- 16800$

$\$1477.28$ NO

3 out of 4

- Incorrect lease payments in Part A (incorrect application of taxes)
- Correct total amount in Part A (follow-through error) (1 mark)
- Correct answer in Part B (follow-through error) (1 mark)
- Correct justification in Part C (1 mark)

Note to marker: A maximum of one mark is deducted for an incorrect, but consistent application of taxes in parts A, B, and C.

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Question 23 E5.V.1 2 marks

A vehicle is worth \$37 650. The vehicle's value depreciates at a rate of 20% per year.

Calculate the value of the vehicle at the end of the second year.

Show your work.

Answer:

$$\left.\begin{aligned}&\text{Year 1: } 37\,650 \times 0.20 = 7530\\ &\qquad 37\,650 - 7530 = \$30\,120\end{aligned}\right\} \leftarrow \text{1 mark for process}$$

$$\text{Year 2: } 30\,120 \times 0.20 = \$6024$$

$$\text{Value of vehicle} = 30\,120 - 6024$$

$$= \$24\,096 \qquad \leftarrow \text{1 mark}$$

OR

Answer:

$$\text{Value after Year 1: } 37\,650 \times 0.80 = \$30\,120 \qquad \leftarrow \text{1 mark}$$

$$\text{Value after Year 2: } 30\,120 \times 0.80 = \$24\,096 \qquad \leftarrow \text{1 mark}$$

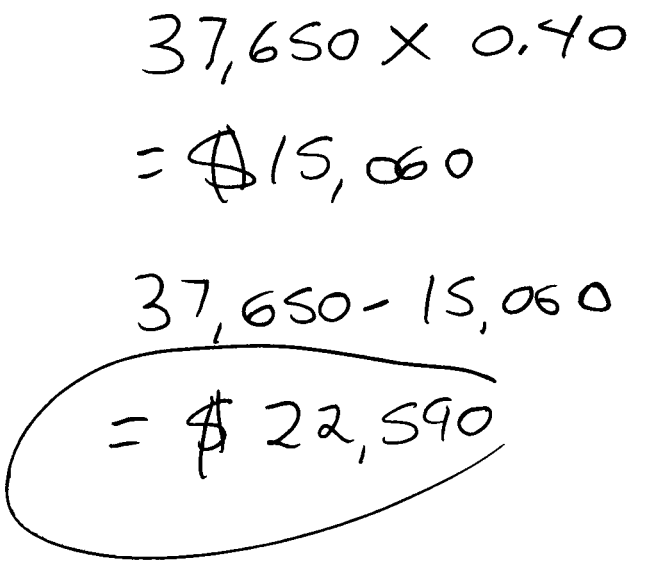
OR

Answer:

$$37\,650 \times (1 - 0.20)^2 \qquad \leftarrow \text{1 mark for process}$$

$$= \$24\,096 \qquad \leftarrow \text{1 mark}$$

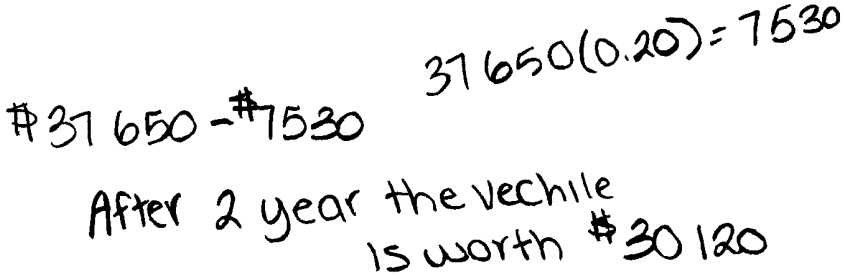
Exemplar 1



1 out of 2

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

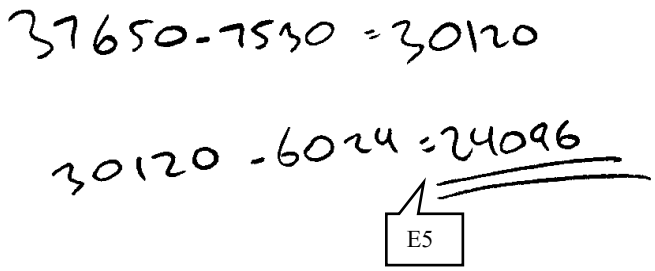
Exemplar 2



1 out of 2

- Correct value after Year 1 (1 mark)
- Incorrect value after Year 2

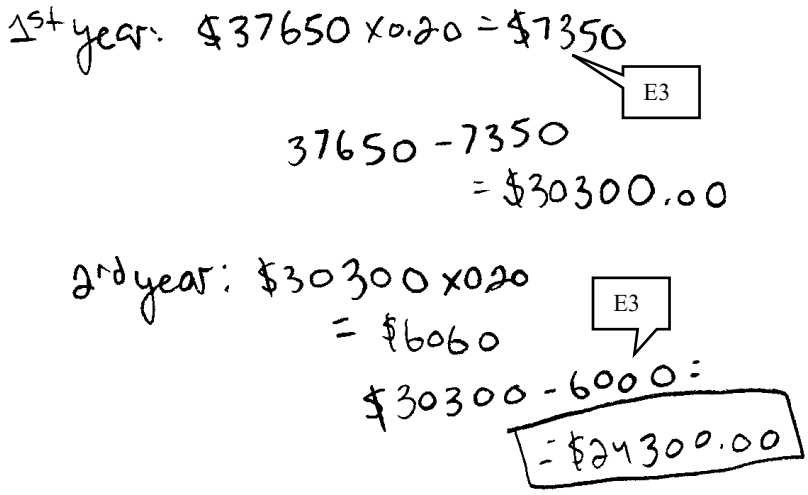
Exemplar 3



2 out of 2

- Correct value after Year 1 (1 mark)
- Correct value after Year 2 (1 mark)
- E5 (does not include units in final answer)

Exemplar 4



2 out of 2

- Correct process (1 mark)
- Correct final answer (1 mark)
- E3 (makes a transcription error)

Probability

Question 24 E6.P.1 1 mark

The odds of winning a race are $1:3$.

State the probability of winning this race.

Answer:

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

Note to marker: Accept equivalent representations.

Question 25 E6.P.1 1 mark

Probability represents a comparison between the number of favourable outcomes and the total number of outcomes.

Explain what odds represents.

Sample Answers:

- a comparison between a favourable outcome and the number of unfavourable outcomes (or vice versa)
- a part-part relationship
- for : against

Exemplar 1

a ratio of one thing to another
ie. 4 squares and 3 circles
represented as squares to circles would
be 4:3

0 out of 1

- Incorrect response (explained ratio, not odds)

Exemplar 2

Example

Prob (for winning) 3/10

Odd = (for winning) 3:7

1 out of 1

- Correct response (1 mark)

Exemplar 3

Odds presents the number of failier :
number of succsesful out comes.

1 out of 1

- Correct response (1 mark)

Exemplar 4

Chances of it happening / Chances of it not happening

1 out of 1

- Correct response (1 mark)

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Question 26 E6.P.1 4 marks

"Pop the Balloon" is a carnival game that involves popping a balloon with a dart. There are 50 balloons taped to a wall, each with a coloured piece of paper inside. It costs \$1 to play and the prizes are listed in the table below.

Pop the Balloon		
Colour of Paper Inside of the Balloon	**Number of Balloons (Out of 50)**	**Prize Value per Balloon**
Red	12	\$5
Blue	18	\$3
White	20	\$0

A) Calculate the expected value of this game from a player's perspective. (3 marks)

Show your work.

Answer:

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

$$= \underbrace{\left(\frac{12}{50}\right)(\$4) + \left(\frac{18}{50}\right)(\$2)}_{1 \text{ mark}} - \underbrace{\left(\frac{20}{50}\right)(\$1)}_{1 \text{ mark}}$$

$$= (0.24)(4) + (0.36)(2) - 0.4$$

$$= 0.96 + 0.72 - 0.4$$

$$= \$1.28 \quad \leftarrow 1 \text{ mark}$$

OR

$$\text{Average earnings} = \left(\frac{12}{50}\right)(\$5) + \left(\frac{18}{50}\right)(\$3) \quad \leftarrow 1 \text{ mark for process}$$

$$= \$2.28 \quad \leftarrow 1 \text{ mark}$$

$$\text{Expected value} = 2.28 - 1$$

$$= \$1.28 \quad \leftarrow 1 \text{ mark}$$

B) Justify whether the carnival should continue to offer this game based on your answer in Part A. (1 mark)

Sample Answers:

- No, the game has a positive expected value for the player, so the carnival will lose money over time.
- No, the game has a negative expected value for the carnival.

Exemplar 1

A) $(0.6)(7) - (0.4)(1)$

$4.2 - 0.4 = 3.8$ E6

E5

B) No because the chances to win are so much higher they won't make money

2 out of 4

- Incorrect P(win) × $gain in Part A
- Correct P(lose) × $loss in Part A (1 mark)
- Correct final answer (follow-through error) in Part A (1 mark)
- Incorrect response in Part B
- E5 (does not include units in final answer)
- E6 (does not express the answer to the appropriate number of decimal places)

Exemplar 2

A) $EV = (\frac{30}{50})(\$3) - (\frac{20}{50}) \times (\$1)$

$4.8 - 0.4 = \$4.40$

B) yes, because it is likely you will make a small profit and not lose money.

may not benefit carnival company but benefits the player of the game.

2 out of 4

- Incorrect P(win) × $gain in Part A
- Correct P(lose) × $loss in Part A (1 mark)
- Correct final answer (follow-through error) in Part A (1 mark)
- Incorrect response in Part B

Exemplar 3

A)

Expected value = P(win) x payout - what u pay to play.
= (P(red)) x 5) + (P(blue) x 3) - $1.00
= (12 x 5) + (18 x 3) - 1.00
= 60 + 54 - 1.00
= $113

1
12
18
+ 20
50
balloons.

B) No I don't think they should. Patrons only pay $1.00 to play but they can win up to $113.00

2 out of 4

- Incorrect process in Part A
- Correct average earnings in Part A (follow-through error, incorrect representation of probability counts as one incorrect value) (1 mark)
- Correct expected value in Part A (follow-through error) (1 mark)
- Incorrect response in Part B

Exemplar 4

A) Total # of Balloons = 50

24% are red, 36% blue, 40% white

E3

$(.24)(5-1)+(.18)(3-1)-(.40)(1)$

$(.96)+(.36)-(.40)$

$(1.32)-(.40)$

$0.96

B) doesn't seem like people are winning much money, so the carnival could keep the game for straight profit

3 out of 4

- Correct *P*(win) × $gain in Part A (1 mark)
- Correct *P*(lose) × $loss in Part A (1 mark)
- Correct final answer in Part A (1 mark)
- Incorrect response in Part B
- E3 (makes a transcription error)

Question 27 E6.P.1 1 mark

Melissa is planning a trip to the beach.

This week's weather forecast is shown in the table below:

	Day 1	Day 2	Day 3	Day 4	Day 5
Probability of Rain	10%	35%	10%	90%	20%
Temperature	20°C	18°C	25°C	25°C	21°C

Explain which day Melissa should plan to go to the beach, using the given probabilities.

Sample Answers:

- Melissa should plan to go to the beach on Day 3 since the probability of rain is low and the predicted temperature is high.
- Melissa should plan to go to the beach on Day 1 or Day 3 since there is only a 10% probability of rain.

Exemplar 1

On day 4 because there is a very high probability that it will be 25°C of 90%

0 out of 1

- Incorrect response

Exemplar 2

she should go Day 1 because the chance is lower and temp is also lower compared to Day 3.

The hoter it is the more posibility it could rain or cloud because of evaporation of the water that will cause clouds to form

1 out of 1

- Correct response (1 mark)

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Question 28 E6.P.1 1 mark

Shawn says the probability of catching a fish is 60%.

Choose from the letters below the statement that is correct.

A) The probability of not catching a fish is 3 out of 5.

B) The odds for catching a fish are 3 : 2.

C) The odds for catching a fish are 2 : 3.

D) The odds against catching a fish are 3 : 2.

Answer: B

Question 29 E6.P.1 1 mark

Darian says the probability of an event occurring is 150%.

Explain why Darian is incorrect.

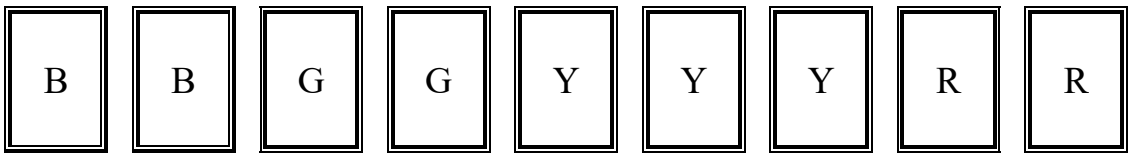
Sample Answers:

Probability cannot be greater than 100%.

Question 30 E6.P.1 2 marks

A set of 40 cards contains 10 red cards, 10 blue cards, 10 green cards, and 10 yellow cards.

Lindsay pulled 9 cards as shown below:



A) State the theoretical probability of pulling a red card. (1 mark)

Answer:

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

Note to marker: Accept equivalent representations.

B) State the experimental probability of pulling a blue card. (1 mark)

Answer:

$\frac{2}{9}$ or 0.22 or 22.22% or two out of nine

Note to marker: Accept equivalent representations.

Exemplar 1

A) $\frac{2}{9}$

B) $\frac{2}{9} = .22\%$

0 out of 2

- Incorrect answer in Part A
- Incorrect answer in Part B (incorrect application of percent symbol)

Exemplar 2

A) 10:40

B) 10:40

1 out of 2

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

Exemplar 3

A) $\frac{10}{40}$

B) 2:7

1 out of 2

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

Exemplar 4

A) $\frac{2.25}{9}$

B) $\frac{2}{9}$ OR 22.22%

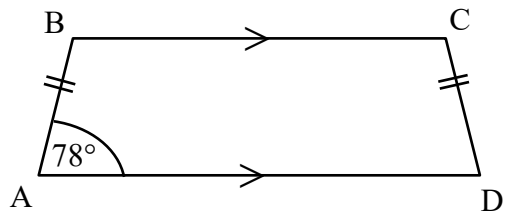
2 out of 2

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

Geometry and Trigonometry

Question 31 E6.G.2 2 marks

The diagram below shows an isosceles trapezoid.



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

Answer:

$\angle D = 78°$

B) State the measure of $\angle B$. (1 mark)

Answer:

$\angle B = 180 - 78$

$= 102°$ $\leftarrow$ 1 mark

Exemplar 1

A) $\angle D = 180 - 78$

$\angle D = 102°$

B) $\angle B = \angle D$

$\angle B = 102°$

0 out of 2
- Incorrect answer in Part A
- Incorrect answer in Part B (contradictory information)

Exemplar 2

A) $78°$

B) $180° - 78 - 78 = 24 \div 2 = \underline{12°}$

$\underline{12°}$

1 out of 2
- Correct answer in Part A (1 mark)
- Incorrect answer in Part B

Exemplar 3

A) Same as $\angle A$ E2

Two angles are the same

B) Same as $\angle C$

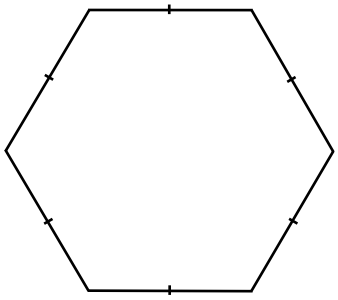
Two sides are the same

1 out of 2
- Correct answer in Part A (1 mark)
- Incomplete answer in Part B
- E2 (answer expressed in an alternative form than requested)

Question 32 E6.G.2 3 marks

A) Calculate the measure of one interior angle in a regular hexagon. (2 marks)

Show your work.



Answer:

$$\text{Interior angle} = \frac{180°(n-2)}{n}$$
$$= \frac{180°(6-2)}{6} \quad \left.\begin{array}{l}\\ \\ \\ \end{array}\right\} \leftarrow 1 \text{ mark for process}$$
$$= \frac{720°}{6}$$
$$= 120° \quad \leftarrow 1 \text{ mark}$$

B) Calculate the measure of one central angle in a regular hexagon. (1 mark)

Answer:

$$\text{Central angle} = \frac{360°}{n}$$
$$= \frac{360°}{6}$$
$$= 60° \quad \leftarrow 1 \text{ mark}$$

Exemplar 1

A) $360 \div 6 = 60°$

B) $180 - 60 = 120°$

0 out of 3
- Incorrect process in Part A
- Incorrect final answer in Part A
- Incorrect answer in Part B

Exemplar 2

A) $360 \div 6 = 60°$

B) $60°$

1 out of 3
- Incorrect process in Part A
- Incorrect final answer in Part A
- Correct answer in Part B (1 mark)

Exemplar 3

A) $\frac{(6-2)(180)}{6} = 120°$

B) $720 - 120 = 600$

$\frac{600}{6} = 100°$

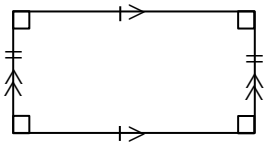
2 out of 3
- Correct process in Part A (1 mark)
- Correct final answer in Part A (1 mark)
- Incorrect answer in Part B

Question 33 E6.G.2 2 marks

A) Describe one reason why all rectangles are parallelograms. (1 mark)

Sample Answers:

- Rectangle



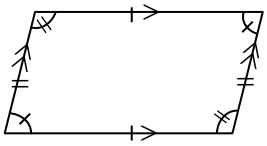
A rectangle has all of the properties of a parallelogram, such as

- two pairs of opposite sides that are parallel
- two pairs of opposite sides that are equal in length
- opposite angles that are equal in measure
- adjacent angles that are supplementary
- diagonals that bisect each other

B) Describe one reason why not all parallelograms are rectangles. (1 mark)

Sample Answers:

- Parallelogram



All parallelograms are not rectangles because

- a parallelogram can have angles that are not $90°$
- diagonals of parallelograms are not equal in length

Exemplar 1

A) Because both have 2 pairs of congruent sides.

B) Because parallelagrams are shaped differently.

0.5 out of 2

- Correct response in Part A (1 mark)
- Lack of clarity in Part A (does not indicate that the congruent sides are opposite each other) (0.5 mark deduction)
- Incorrect response in Part B

Exemplar 2

A) Because in each rectangle ever, there are 2 sets of different parralel lines that meet at 90° angles

B) Because there are plenty more shapes that have parralel lines that aren't rectangles

1 out of 2

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

Exemplar 3

A) – OPPOSITE SIDE ARE PARALLEL AND EQUAL.

B) – NOT EQUAL SIDES

1 out of 2

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

Exemplar 4

A) 2 pairs of opposite sides are parallel

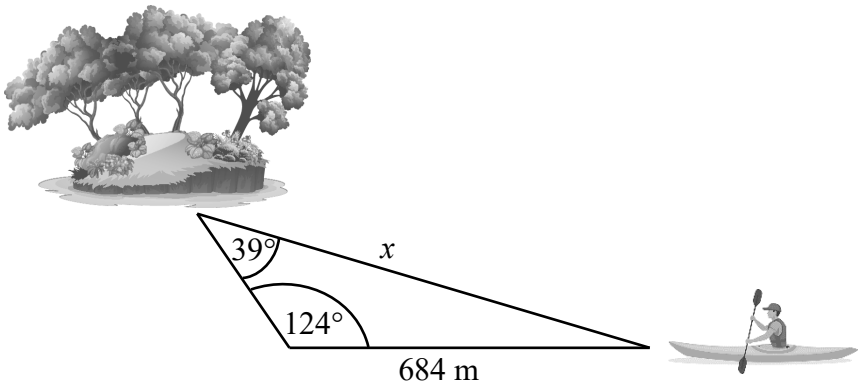
B) when only one pair of opposite sides are parallel because all 4 angles are no longer 90°

1 out of 2

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

Question 34 E6.G.1 3 marks

James is kayaking to an island.



Calculate x, the distance James will travel if he kayaks to the island.

Show your work.

Answer:

$$\frac{a}{\sin A} = \frac{b}{\sin B} \quad \leftarrow 1 \text{ mark for identification of sine law}$$

$$\left.\begin{aligned} \frac{x}{\sin 124°} &= \frac{684}{\sin 39°} \\ x &= \frac{(\sin 124°)(684)}{\sin 39°} \end{aligned}\right\} \leftarrow 1 \text{ mark for process/substitution}$$

$$x = 901.07 \text{ m} \quad \leftarrow 1 \text{ mark}$$

Exemplar 1

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

$$\frac{684m}{\sin 39^\circ} = \frac{b}{\sin B} = \frac{c?}{\sin 124^\circ}$$

$$x = 567.06m$$

2 out of 3

- Correct identification of sine law (1 mark)
- Correct substitution (1 mark)
- Incorrect final answer

Exemplar 2

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

$$\frac{39^\circ}{684_m} = \frac{124^\circ}{x} = \frac{\cancel{x^\circ}}{\cancel{A}}$$

$$\frac{39^\circ}{684_m} \checkmark = \frac{124^\circ}{x}$$

$$\frac{(124 \times 684)}{39} = 2174.77m$$

2 out of 3

- Correct identification of sine law (1 mark)
- Incorrect substitution
- Correct final answer (follow-through error) (1 mark)

Exemplar 3

$$\frac{(\sin 124)(684)}{(\sin 39)} = 901.10\text{ m}$$

E6

3 out of 3

- Correct identification of sine law (1 mark)
- Correct process (1 mark)
- Correct final answer (1 mark)
- E6 (rounds incorrectly)

Question 35 E6.G.2 1 mark

Choose the letter that best completes the following statement.

Isosceles triangles have

A) all side lengths equal

B) two equal side lengths

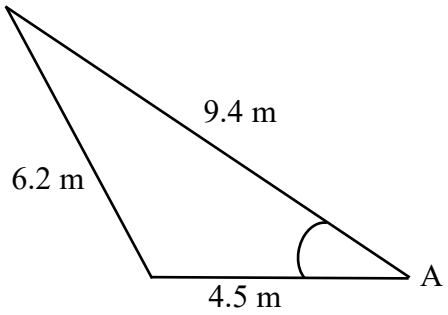
C) no equal side lengths

D) three equal angles

Answer: B

Question 36 E6.G.1 3 marks

Calculate the measure of $\angle A$.



Show your work.

Answer:

$\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$ ← 1 mark for identification of cosine law

$\cos A = \dfrac{(4.5)^2 + (9.4)^2 - (6.2)^2}{2(4.5)(9.4)}$

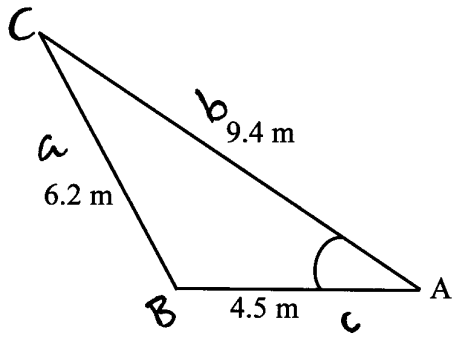
$\cos A = \dfrac{20.25 + 88.36 - 38.44}{84.6}$ ← 1 mark for process/substitution

$\cos A = \dfrac{70.17}{84.6}$

$\angle A = \cos^{-1}(0.829\,4...)$

$\angle A = 33.96°$ ← 1 mark

Exemplar 1



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

$$\cos(A) = \frac{88.36 + 20.25 + 38.44}{2 \times 88.36 \times 20.25} = \frac{147.05}{3,578.58}$$

$$\cos(A) = \frac{147.05}{3,578.58} = 0.04109...$$

$$A = \cos^{-1}(0.04109...)$$

$$A = 87.64\text{m}$$ E5

2 out of 3

- Correct identification of cosine law (1 mark)
- Incorrect substitution
- Correct final answer (follow-through error) (1 mark)
- E5 (uses incorrect units of measure)

Exemplar 2

$$\frac{(9.4^2 + 4.5^2 - 6.2^2)}{2(4.5)(9.4)}$$

$$= .82 \quad \text{or} \quad 82^\circ$$

2 out of 3

- Correct identification of cosine law (1 mark)
- Correct substitution (1 mark)
- Incorrect final answer

Exemplar 3

$$\cos A = \frac{6.2^2 - 9.4^2 - 4.5^2}{-2(9.4)(4.5)}$$

$$= \frac{-70.17}{-80.6}$$

$$\cos^{-1} = 29.47$$

2 out of 3

- Correct identification of cosine law (1 mark)
- Correct substitution (1 mark)
- Incorrect final answer

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Statistics

Question 37 E5.S.1 1 mark

A class of 10 students was surveyed. The students were asked how many hours per week they spend doing homework.

The survey results, in hours, are shown below:

2	6	3	4	3.5	2.5	8	4	5.5	1.5

State the median.

Answer:

1.5 2 2.5 3 $\underbrace{3.5 \quad 4}$ 4 5.5 6 8

$$\text{Median} = \frac{3.5 + 4}{2}$$

$$= \frac{7.5}{2}$$

$= 3.75$ hours ← 1 mark

Exemplar 1

2	6	3	4	3.5	2.5	8	4	5.5	1.5

1.5, 2, 2.5, 3, 3.5, 4, 4, 5.5, 6, 8

3.5/4

7.5

0 out of 1

- Incorrect answer

Exemplar 2

2	6	3	4	3.5	2.5	8	4	5.5	1.5

1.5, 2, 2.5, 3, 3.5, 4, 4, 5.5, 6, 8

$\frac{3.5+4}{2}$

$= 5.5$

5.5 hrs

0 out of 1

- Incorrect answer

Exemplar 3

2	6	3	4	3.5	2.5	8	4	5.5	1.5

1.5, 2, 2.5, 3, 3.5, 4, 4, 5.5, 6, 8

$\frac{3.5+4}{2} = 7$

0 out of 1

- Incorrect answer

Question 38 E5.S.1 3 marks

The table below shows the number of cars sold by a salesperson for the first six months of the year.

Month	Number of cars sold
January	4
February	10
March	18
April	20
May	32
June	12

A) Calculate the mean number of cars sold per month. (1 mark)

Answer:

$$\text{Mean} = \frac{4+10+18+20+32+12}{6}$$

$$= \frac{96}{6}$$

$$= 16 \text{ cars} \quad \leftarrow 1 \text{ mark}$$

B) Calculate the trimmed mean by removing the highest and lowest number of cars sold. (2 marks)

Show your work.

Answer:

$$\text{Trimmed mean} = \frac{10+18+20+12}{4} \quad \leftarrow 1 \text{ mark for process}$$

$$= \frac{60}{4}$$

$$= 15 \text{ cars} \quad \leftarrow 1 \text{ mark}$$

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

Exemplar 1

A) $4+10+18+20+32+12$

96

B) $10+18+20+12$

60

1 out of 3

- Incorrect mean in Part A
- Correct numerator in Part B (1 mark)
- Incorrect trimmed mean in Part B

Exemplar 2

A) $\frac{96}{6} = 16$

16

B) $\frac{80}{4} = 20$

20

2 out of 3

- Correct mean in Part A (1 mark)
- Incorrect numerator in Part B
- Correct trimmed mean in Part B (follow-through error) (1 mark)

Exemplar 3

A)

16 cars

B)

15 cars

2 out of 3

- Correct mean in Part A (1 mark)
- No process shown in Part B
- Correct trimmed mean in Part B (1 mark)

Exemplar 4

A) $4+10+18+20+32+12 \div 6 = 86$

86

B) $10+18+20+12 \div 4 = 51$

51

2 out of 3

- Incorrect mean in Part A (order of operations)
- Correct process in Part B (1 mark)
- Correct trimmed mean in Part B (follow-through concept error) (1 mark)

Note to marker: A maximum of one mark is deducted for incorrect application of order of operations.

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Question 39 E5.S.2 2 marks

Juan is 1.7 m tall. He is taller than 45 other students in his grade. Including Juan, there are 60 students in total.

A) Calculate Juan's percentile rank. (1 mark)

Answer:

$$PR = \frac{b}{n}$$
$$= \frac{45}{60}$$
$$= 75 \quad \text{or} \quad 75\text{th} \quad \text{or} \quad PR_{75} \qquad \leftarrow 1 \text{ mark}$$

B) State the percentage of students in Juan's grade that are 1.7 m or taller. (1 mark)

Answer:

$$100 - 75$$
$$= 25\% \qquad \leftarrow 1 \text{ mark}$$

OR

Answer:

$$\frac{15}{60} \times 100$$
$$= 25\% \qquad \leftarrow 1 \text{ mark}$$

Exemplar 1

A) $\frac{45}{60} \times 100 = 75\%$

- JUAN IS TALLER THAN 75% OF OTHER STUDENT IN HIS GRADE

B) 25%.

1 out of 2

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

Exemplar 2

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

$\frac{45}{60} \times 100$

$0.75 \times 100 = 75\%$

P_{75}

B) $100 - 75 = 25\%$

P_{25}

1 out of 2

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

Exemplar 3

A) 76%

B) 24% are higher than him

1 out of 2

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

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Question 40 E5.S.1 2 marks

Nina wants a mean score of 80% on her math quizzes. There are five quizzes in total and her marks, as a percent, for the first four quizzes are shown below:

Quiz	Percent (%)
1	73
2	90
3	95
4	70
5	x

Calculate the percent Nina needs on Quiz 5 to make sure her mean quiz score is 80%.

Show your work.

Answer:

$$\frac{73+90+95+70+x}{5}=80$$

$$\frac{328+x}{5}=80$$

$$328+x=400$$

← 1 mark for process

$$x=72\%$$

← 1 mark

Exemplar 1

$$\frac{73+90+95+70+x}{5} = 0.8$$

$$\frac{80}{100} = \frac{328+x}{5}$$

1 out of 2

- Correct substitution (1 mark)
- Incorrect final answer

Exemplar 2

$$\frac{324+75}{5} = 40.6\%$$

1 out of 2

- Correct process (guess and check) (1 mark)
- Incorrect final answer

Question 41 E5.S.1 2 marks

Marisse took an art class. Her final mark is calculated according to the categories shown below:

Category	Weight	Mark (out of 100)
Paintings	30%	76
Photography	20%	92
3D Animations	10%	68
Drawings	40%	90

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

Show your work.

Answer:

$$\text{Final mark} = (0.30 \times 76) + (0.20 \times 92) + (0.10 \times 68) + (0.40 \times 90) \quad \leftarrow 1 \text{ mark for process}$$

$$= 22.8 + 18.4 + 6.8 + 36$$

$$= 84 \quad \leftarrow 1 \text{ mark}$$

OR

Answer:

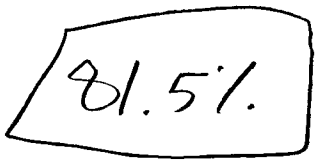
$$\text{Final mark} = \frac{(30 \times 76) + (20 \times 92) + (10 \times 68) + (40 \times 90)}{100} \quad \leftarrow 1 \text{ mark for process}$$

$$= \frac{8400}{100}$$

$$= 84 \quad \leftarrow 1 \text{ mark}$$

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

Exemplar 1



$76 + 92 + 68 + 90 = 326 \div 4 = 81.5$

0 out of 2

- Incorrect process
- Incorrect final answer

Exemplar 2

Category	Weight	Mark (out of 100)
Paintings	30%	76
Photography	20%	92
3D Animations	10%	68
Drawings	40%	90

2280
1940
680
3600 +
8400
326

$\frac{8400}{326} = 25.76$ E6

1 out of 2

- Incorrect process
- Correct final answer (follow-through error) (1 mark)
- E6 (rounds incorrectly)

Appendices

Appendix A:
Table of Questions by Unit and Learning Outcome

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

Probability		
Question	**Learning Outcome**	**Mark**
24	E5.S.1	1
25	E5.S.1	1
26 a)	E5.S.1	3
26 b)	E5.S.1	1
27	E5.S.1	1
28	E5.S.1	1
29	E5.S.1	1
30 a)	E6.P.1	1
30 b)	E6.P.1	1
		Total = 11
Geometry and Trigonometry		
Question	**Learning Outcome**	**Mark**
31 a)	E6.G.2	1
31 b)	E6.G.2	1
32 a)	E6.G.2	2
32 b)	E6.G.2	1
33 a)	E6.G.2	1
33 b)	E6.G.2	1
34	E6.G.1	3
35	E6.G.2	1
36	E6.G.1	3
		Total = 14
Statistics		
Question	**Learning Outcome**	**Mark**
37	E6.P.1	1
38 a)	E6.P.1	1
38 b)	E6.P.1	2
39 a)	E6.P.2	1
39 b)	E6.P.2	1
40	E6.P.1	2
41	E6.P.1	2
		Total = 10

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: _____

_____

_____

_____

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_____

Decision: _____

_____

_____

_____

_____

_____

_____

Marker's Signature: _____

Principal's Signature: _____

For Department Use Only—After Marking Complete

Consultant: _____

Date: _____

Appendix C:
Marking Guidelines

A 0.5 mark deduction will apply each time there is a 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 clearly indicated (e.g., 3/4 and 3:1 presented, but final answer not indicated)
- answer is presented in another part of the question
- too much information is presented in the answer and the information is numerically and conceptually correct (If contradictory information is provided, no mark is awarded.)

E2 (Notation)

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

E3 (Transcription/Transposition)

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

E4 (Whole Units)

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

E5 (Units)

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

E6 (Rounding)

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