Grade 12 Essentials

73

Key

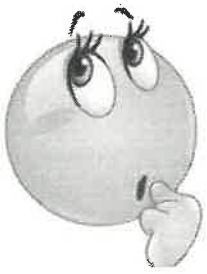
+14 Bonus

Week 8 Quiz

Solutions Debrief

MrF

24-05-23



MrF

GRADE 12 ESSENTIAL
WEEK 8 QUIZ 24-05-23

Name:_____
Date: _____

OPEN BOOK; Take-Home.

Round all decimal amounts to the nearest 0.01 unless otherwise indicated (standard).

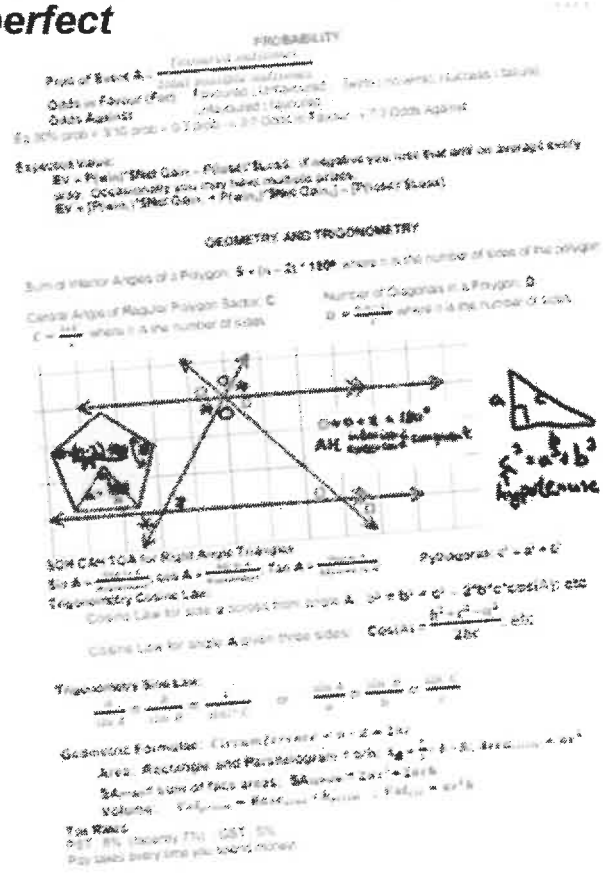
Show work, show method. Generally, just *stating* an answer gets zero marks. Part marks possible

Time Limit: **Due: Monday 10:00; absolutely no later than** **Collaborate** with other students if you want! Late Penalty Applies

It is **possible** to get up to **150%** on this quiz if you try the Bonus Questions!

Lucky for students this is a take home quiz due to the TV filming in the Classrooms. It is modified, made it a little more challenging, but five nights plus an at-home-study Friday, to complete it! Worth up to 150% again!

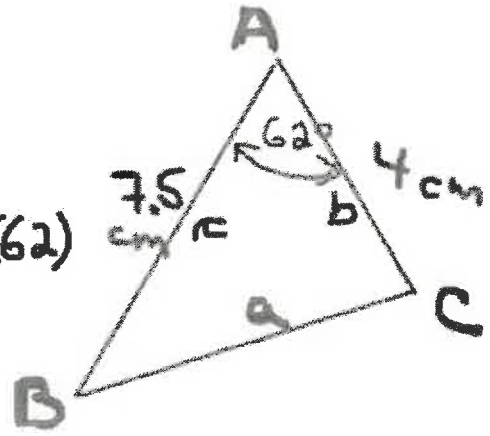
Make sure your cheat sheet is up to snuff! Could be up to an extra 5% of course mark IF perfect



Cheat Sheet Marking Rubric As discussed weekly since September!

Item	Weight Factor of Item
Covers each unit studied	20%
Lists formulae used for each unit, *some* with example usage (not necessary to write out Unit Conversions, or Geometric Shapes formulae such as cones, prisms. Do not copy out Loan Tables, etc)	20%
Uses diagrams where appropriate, graphic organizers, etc. Pictures are worth a 1,000 words.	20%
Is accurate and correct	20%
Is neat and readable	20%

1. Determine the measure of length *a*.



4

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

$a^2 = 4^2 + 7.5^2 - 2 \cdot 4 \cdot 7.5 \cdot \cos(62)$

$a^2 = 44.0817\ldots$

$a = \sqrt{ANS} \cong 6.64$ cm

show units!

$4^2 + 7.5^2 - 2 \cdot 4 \cdot 7.5 \cdot \cos(62)$

$= 44.08170628$

$\sqrt{44.0817062328}$

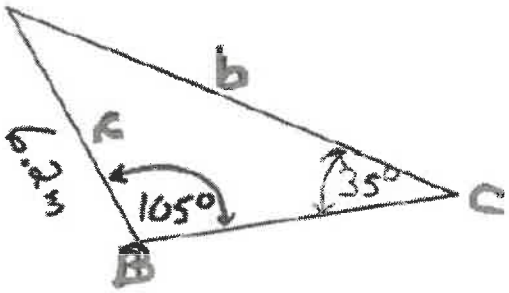
$= 6.639405563$

- Label Diagram
- Select Formula
- Write Down Formula
- Plug in Numbers
- Solve
- Check

Trigonometry Cosine Law:
Cosine Law for side *a* across from angle A: $a^2 = b^2 + c^2 - 2*b*c*\cos(A)$; etc

2. Determine the measure of side *b*.

Two angles an a side:
SINE LAW
angle & side pairs



4

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

$\sin(105) \cdot \frac{b}{\sin(105°)} = \frac{6.2}{\sin(35)} \cdot \sin(105)$

$\frac{b}{\sin(105°)} = \frac{6.2}{\sin(35)}$

$b = \frac{6.2 \cdot \sin(105)}{\sin(35)}$

$b = 10.44$ m TLAR.

show units!

$6.2 \cdot \frac{(\sin 105)}{\sin(35)}$

$= 10.4410$

- Label Diagram ✓
- Select Formula ✓
- Write Down Formula ✓
- Plug in Numbers ✓
- Solve ✓
- Check ✓

MFS Show work 2

3. Statistics. Determine the mean, median, and mode of the data set. (4 marks)

{ 1, 3, 4, 4, 8, 4, 12 }

Mean, $\bar{x}$ = $\frac{\Sigma x}{n} = \frac{36}{7} = 5.14$

Median, $\tilde{x}$, = $\tilde{x} = 4$ { 1, 3, 4, 4, 8, 12 }

1 2 3 4 5 6 7

$\frac{(7+1)}{2} = 4^{th}$ element

Mode = (4) is the most frequent

Range = $x_{max} - x_{min} = 12 - 1 = 11$

(4)

STATISTICS

Mean. $\bar{x} = \frac{\Sigma x_i}{n}$; sum up all the data and divide by the data set size, n

Weighted Mean: $\frac{\Sigma(x_1 * wf_1 + x_2 * wf_2 + x_3 * wf_3 + \cdots)}{(wf_1 + wf_2 + wf_3 + \cdots)} = \frac{\sum x_i f_i}{\sum w f_i}$

My cheat sheet

Median, $\tilde{x}$. Line data up in ascending order, find the data value at the middle place.

Middle place = $\frac{(n+1)}{2}$. Eg: n= 17 data → middle place is the 9th place. With 20 data → place is the mean between the 10th and 11th place, value in 10 and a 'halfth' place.

4. Statistics- Percentile Rank. Josh was writing a qualification exam for a desirable government job. He got 45 marks out of a possible 78 marks on the exam. 345 applicants wrote the exam, 288 got a worse exam score than Josh, and six *others* had the same score as Josh.

a. Determine Josh's mark on the qualification exam as a percent.

b. Determine Josh' Percentile Rank on the examination.

c. **Explain** (using proper grammar) whether you think the exam was likely easy or difficult.

(4)

(3)

a) $45/78 = x/100$; $x = 57.69$; $\frac{57.69}{100} = 57.69\%$

b) $PR = \frac{B + \frac{1}{2}(E)}{N} \cdot 100 = \frac{[288 + \frac{1}{2}(7)]}{345} \cdot 100 \nearrow = (85)$

P_{85}

85th place

c) **Josh had a fairly low mark on the exam, but 85% of student were the same or worse than him, so the exam must have been pretty difficult! Josh was in the top 15% of those who wrote, despite the poor exam mark.**

/10 7

Percentile Rank $PR = \frac{B + \frac{1}{2}E}{N} * 100$ round up!, where **B** is the number of scores below number equal, and **N** is the total number. my cheat sheet

Percentiles and Quartile Ranks. $P_{25} = Q_1$; $P_{50} = Q_2 =$ Median; $P_{75} = Q_3$.

5. Problem Solve – Use a Table – Follow a Pattern. A frog is on a lily pad, it eats **one** fly on the first lily pad. It hops to a **second** lily pad and **eats three more** flies than eaten on the first lily pad, then it jumps to a **third** lily pad and **eats three more than the previous** lily pad, and so on, so that at every lily pad it eats three more flies than the previous lily pad.

Complete the table:

Lily Pad	1	2	3	4	5	6	7	8	9	10
Flies	1	4	7	10	13	16	19	22	25	28
Total Eaten	1	5	12	22	35	51	70	92	117	145

4

State the answers to the following: (1 mark each)

a. How many flies total will the frog have eaten when he has eaten the flies on the 8th lily pad? Answer: 92

2

b. On which lily pad will it have eaten its 50th fly? Answer: 6th lily pad

Follow the pattern Step-by-step

6. Probability. The probability of a dog successfully performing a trick is 75%. Determine the ***odds against*** the dog performing the trick successfully.

$$P(\text{success}) = \frac{\#\text{ of outcomes that are success}}{\#\text{ of total outcomes}} = \frac{\#\text{ of successes}}{\#\text{ of tries}}$$

$$P(\text{success}) = \frac{75}{100} = \frac{3}{4}$$

3 successes / 4 tries

7

Odds against

1 : 3

Not Success : Success

Just like in sports betting, if it is a sure thing it will not have a good payout!

6

PROBABILITY

Prob of Event A = $\frac{\text{favoured outcomes}}{\text{total possible outcomes}}$

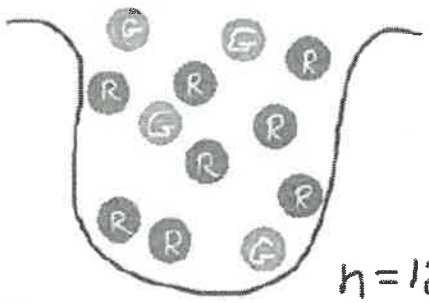
Odds in Favour (For). Favoured : Unfavoured ; {wins : no wins}, (success : failure)

Odds Against. unfavoured : favoured

Eg 30% prob = 3/10 prob = 0.3 prob → 3:7 Odds in Favour → 7:3 Odds Against

$\frac{75}{100} = \frac{3}{4}$

7. **Probability**. A bag contains 4 Green marbles and 8 Red marbles. Determine the probability of drawing a Red Marble. [*Prob(Draw Red)*]. Express the answer as a reduced fraction **and** as a %.



$n = 12$

$$P(\text{Draw Red}) = \frac{\#\text{ of Red}}{\#\text{ Total marbles}}$$

$$= \frac{8}{12} = \frac{2}{3} = 66.67\%$$

7

$\frac{8}{12}$

$= \frac{2}{3}$

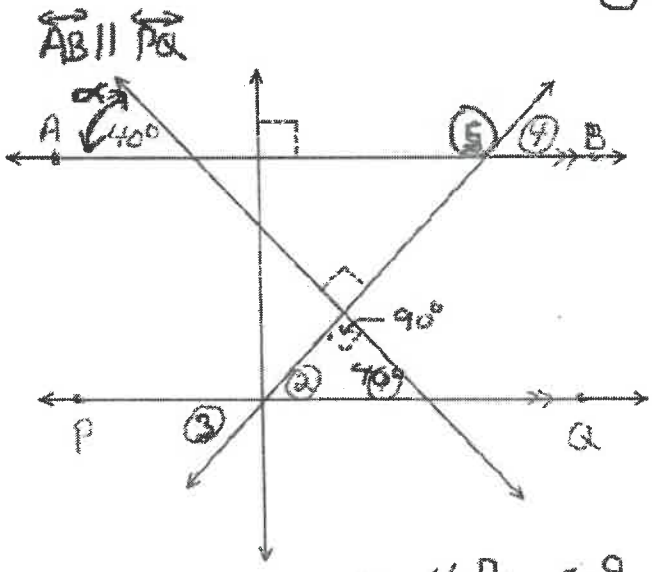
$= 0.6666666$

Prob of Event A $= \dfrac{favoured\ outcomes}{total\ possible\ outcomes}$

MORE BONUS QUESTIONS

(Try them! It is possible to get 150% on this quiz)

BONUS: Euclidian Geometry (1 mark each)



5

(1) = 40° since corresponds with ∠α

(2) = 50° Triangle Sum Theorem

(3) = 50° since a vertical (opposite) angle to (2)

(4) = (2) "corresponds" with angle (2) = 50°

(5) = 180° − (4)
= 180° − 50° = 130°

Since (4)+(5) are supplementary and make a linear pair

STATE the measure of angles (1) = 40° (2) = 50°

(3) = 50° (4) = 50° (5) = 130°

2 + 5

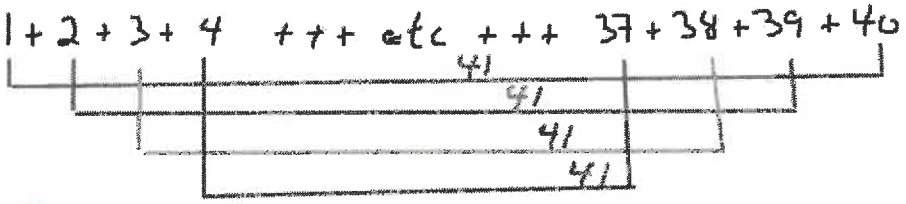
5

MrF

Bonus: (1 Mark) Show work

Determine the sum of the counting numbers from 1 to 39

Strategy: Easy to find the sum from 1 to 40, then just subtract the 40!



See a pattern?

(1)

Pairing up the 'bookends', how many pairs?

$20 \cdot 41 = 820$

Sum of the numbers from 1 to 40 is 820

$-\ 40$ Not there

(780)

```
1+2+3+4+5+6+7+8+
9+10+11+12+13+14
+15+16+17+18+19+
20+21+22+23+24+2
5+26+27+28+29+30
+31+32+33+34+35+
36+37+38+39
                780
```

Several other logical solutions have also been demonstrated

Bonus. Conversion (2 Marks)

Convert two weeks into seconds. 2 wk = _____ sec

$$2\text{wk} \cdot \frac{7\ \text{days}}{1\ \text{wk}} \cdot \frac{24\ \text{hr}}{1\ \text{days}} \cdot \frac{60\ \text{min}}{1\ \text{hr}} \cdot \frac{60\ \text{sec}}{1\ \text{min}}$$

$$= 1{,}209{,}600\ \text{sec}$$

(2)

One million, two hundred nine thousand, six hundred seconds

easier?

$2\text{wk} \cdot 7\ \text{day/wk} = 14\ \text{days}$

$14\ \text{days} \cdot 24\ \text{hr/day} = 336\ \text{hr}$

$336\ \text{hr} \cdot \frac{60\ \text{min}}{1\ \text{hr}} = 20{,}160\ \text{min}$

$20{,}160\ \text{min} \cdot \frac{60\ \text{sec}}{1\ \text{min}} = 1{,}209{,}600\ \text{sec}$

+3

Using a Formula. (2 Marks) The formula to convert degrees Celsius [°C] to the American degrees Fahrenheit [°F] is given by the formula:

$$°F = \frac{9}{5} * °C + 32;$$

Back in Grade 11

Convert 25 degrees Celsius (25°C) into degrees Fahrenheit °F:

25°C = 77 °F

$°F = 9/5 \cdot °C + 32$

$°F = 9/5 \cdot 25 + 32 = 45 + 32 = 77°F$

2

Bonus - Using a Formula. The [Pre-Calculus] formula to count the total number of flies eaten in the question above is given by:

$S_n = \frac{n}{2}[2a_1 + (n-1) * d]$, where S_n is the total sum of flies eaten, a_1 is the number of flies on the first lily pad, n is the number of the lily pad, and d is the amount by which each successive lily pad's fly count increases; d = 3 in this case.

This is Grade 11 stuff if you ever do the Pre-Calculus or the 'Pure' Math as they call it in other provinces. But Essential Math students know how to blindly plug into a formula!

In our case: $S_n = \frac{n}{2} * [2 * 1 + (n-1) * 3]$.

evaluate that formula (plug-in) for **n = 15** to calculate how many flies were eaten total [S_n] after the 15th lily pad. [2 marks]

2

After 15 Lilly pads the frog has eaten a total sum of 330 flies.

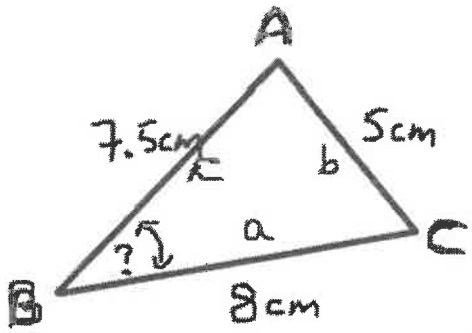
$S_{15} = \frac{15}{2} \cdot [2 \cdot 1 + (15-1) \cdot 3] = 7.5 \cdot [2 + 42]$

$= 330$ flies

9	10	11	12	13	14	15
25	28	31	34	37	40	43
117	145	176	210	247	287	330

+4

Bonus: Determine angle B.



Cosine Law
Since Given 3 sides

$$\angle B = \cos^{-1}\left(\frac{a^2+c^2-b^2}{2\cdot a\cdot c}\right)$$

$$\angle B = \cos^{-1}\left(\frac{[8^2+7.5^2-5^2]}{[2\cdot 8\cdot 7.5]}\right)$$

$$\angle B = \cos^{-1}\left(\frac{95.25}{120}\right)$$

$$\angle B = 37.46^\circ$$ T.L.A.R.

Smallest angle has smallest side across ✔

12

Cheat sheet

$$\text{Cos(A)} = \frac{b^2+c^2-a^2}{2bc}\text{; etc}$$

$$\cos^{-1}\left(\frac{95.25}{120}\right) = 37.46265$$

- Label Diagram
- Select Formula
- Write Down Formula
- Plug in Numbers
- Solve
- Check

Five nights, with a long weekend and at-home-study Friday, to complete a 60 minutes quiz

Easy 150%

12

On time, on target

BEST BAR NONE

LOAD CLEAR !

Determined to Deliver