

Solutions to:
GR11ESS_EndTermPracticeExam2.pdf

Some of questions we not have fully covered in class? **PART 2 OF 2**

Some Mid-Term Stuff

Show work for best marks!

Use your one-page 'cheat sheet' reference notes that you are slowly compiling

Use a calculator to its full effect (**no smart phones**)

Geometric Formulas will be provided

Bonus questions are provided in the event you want or need them! They will not get you above 100% though.

MULTIPLE CHOICE (2 marks each)

Circle the letter of the best or closest answer

1. 54% of a 360° circle is how large a central angle?

- a. 194° b. 6.67° c. $\frac{0.54}{100}$ d. $\frac{0.54}{360}$
- Handwritten notes:*
 - a. 194° is circled.
 - b. 6.67° → dumb
 - c. $\frac{0.54}{100}$ → dumb
 - d. $\frac{0.54}{360}$ → dumb
 - Calculation: $\frac{54}{100} \cdot 360 = 194.40^\circ$
 - Note: lol common sense! A bit more than half of 360°

OPEN REPOSE

Show Work for best mark.

Round answers to nearest 0.01 where appropriate.

Handwritten notes:
 - estimate
 - Show units.
 - Check if answer is reasonable
 - use your single sheet reference notes etc...

2. The volume of sphere of diameter 12 cm is:

- a. ~~452.39 cm²~~ b. 1728 cm³ c. 905 cm³ d. ~~30.62 L~~
- Handwritten notes:*
 - a. ~~452.39 cm²~~ → dumb; area
 - b. 1728 cm³
 - c. 905 cm³ is circled.
 - Calculation: $V = \frac{4}{3}\pi r^3 = \frac{4}{3} \cdot \pi \cdot 6^3 = 905 \text{ cm}^3$
 - Note: picture it a bit bigger than your fist.
 - Note: way too big!
 - Note: Rule of 72: If years · rate = 72 then double
 - Calculation: $6 \cdot x = 72$
 $x = 12 \text{ years to double}$
 - Note: completely unrealistic!

3. Approximately how long will it take a compounding interest investment to double if the percentage rate (APR) is 6%.

- a. 12 years b. 10 years c. 6 years d. $\frac{1}{2}$ of a year
- Handwritten notes:*
 - a. 12 years is circled.
 - Note: completely unrealistic!

5. A good way to misrepresent the display of vertical bar graph data is:

- a. use wrong and made-up numbers
- b.** do not start the vertical axis at zero
- c. use wonky colours
- d. use a horizontal bar graph instead of a vertical bar graph

6. If $2x + 7 = 8$; what is the value of x ?

- a. 3
- b. 0.5**
- c. 0
- d. none of these

$$2x + 7 = 8 \quad \text{undo the add 7}$$

$$2x = 1 \quad \text{undo the double}$$

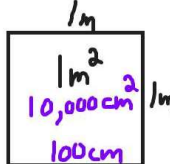
$$x = \frac{1}{2} \text{ or } 0.5 \quad \text{Check!}$$

Just test each answer to see what works

8. 10,000 square cm (cm^2) is the same area as:

- ~~a.~~ A football field
 WAY silly
- ~~b.~~ the volume of a box of popcorn
 Volume is not area!
- c.** 1 square metre
 ONLY Logical answer
- ~~d.~~ a tube of tooth paste
 doesn't make sense

Picture it! The area of 10,000 baby finger nails.



7. An investment that has interest compounded quarterly has interest calculated:

- a. Twice per year
- b.** 4 times per year
- c. daily
- d. every Sunday

4 quarters in a dollar
4 quarter years in one year!

9. A cube with a square base of area 16 in^2 has a corresponding square pyramid with the same base and height that has a volume of:

- a. 21.33 in^3**

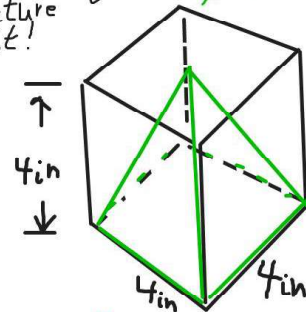
Way too big
4 ft³ Silly
Picture it!

This is the cube!
~~c. 64 in^3~~

~~d. 4x doesn't make sense~~

The cube would be $4 \text{ in} \cdot 4 \text{ in} \cdot 4 \text{ in}$
 $= 64 \text{ in}^3$

So the pyramid is $\frac{1}{3}$ as much volume.
 $\frac{1}{3} \cdot 64 \text{ in}^3 = 21.33 \text{ in}^3$



Base area = 16 in^2

Draw it!
Goodness!

10. The surface area of a sphere of radius 5 cm is:

- a. ~~314.16 cm³~~ b. 314.16 cm² c. 1257 cm² d. 25 cm²
- wrong volume* *about the size of your fist?!* *way to big* *way to small!*

Just picture how big this is! Only one logical answer?

$$SA_{\text{sphere}} = 4\pi r^2 = 4 \cdot \pi \cdot (5\text{cm})^2$$

$$SA = 100 \cdot \pi = 314.16\text{cm}^2$$

2. Kyle wants to borrow some money from a Pay Day loan company. He borrows \$600 for two months. Normally compound interest is used, but for a short period the simple interest calculation gives the same answer within a couple dollars. He pays them back a total of \$700. What annual interest rate (%), r , was Kyle paying for the use of that money (use simple interest)?

$$I = Pr \cdot t$$

$$100 = 600 \cdot r \cdot \frac{2}{12}$$

$$\frac{100}{600} = \frac{100 \cdot r}{100}$$

← Tidy up *Solve* *t is years! so 2 months is 2/12 of a year*

100% = 1 = r

He borrowed 600 and paid back 700 so I=100

Kyle paid an annual rate of 100% Interest rate
 [I think more than 60% is illegal now?]

1. Wanda borrows \$2,200 from her aunt for six months. Her aunt charges her simple interest of 10% annual interest rate (APR). $I = Prt$

- a. How much interest does Wanda have to pay for the use of her aunt's money, and *The interest is \$110.*
- b. what is the total amount Karen pays back to her aunt? *She pays back \$2,310*
- a) $I = \$2,200 \cdot \frac{10}{100} \cdot \frac{6}{12} = \110 Interest
- b) $A = P + I = \$2,200 + \$110 = \$2,310$

3. Alyssia's uncle bought her a \$2,500 Canada Savings Bond (CSB) from the government on the day she was born. It pays 10% annual interest compounded monthly. On her 21st birthday her uncle gave it to her. What is the total value amount, A, of her CSB after that 21 years?

$$A = P \left(1 + \frac{r}{n}\right)^{n \cdot t}$$

$$A = 2,500 \cdot \left(1 + \frac{0.1}{12}\right)^{21 \cdot 12}$$

$$A = \frac{2500 \cdot (1 + 0.1/12)^{252}}{(21 \cdot 12)} = 20238.54675$$

\$20,238.55

which makes sense using rule of 72
 It should double every seven years or so
 so 2,500 → 5,000 → 10,000 → 20,000 ✓

10% = $\frac{10}{100} = 0.1$

4. Josh wants to take a loan to buy a car. The total cost he is going to finance with a loan is \$24,000. He negotiates an Annual Percentage Rate [APR] of 20% over a term of three years with regular monthly payments. (btw: 20% is a very bad and predatory rate if you are borrowing!)

- a. how much are Josh's monthly payments? \rightarrow monthly payment \$891.84
 b. how much interest does Josh end up paying on the \$24,000 loan over the three years? What does his car cost after all the payments?

Annual Rate	1 Year Monthl y	2 Years Monthl y	3 Years Monthl y
2%	\$84.24	\$42.54	\$28.64
3%	\$84.69	\$42.98	\$29.08
4%	\$85.15	\$43.42	\$29.52
16%	\$90.73	\$48.96	\$35.16
18%	\$91.68	\$49.92	\$36.15
20%	\$92.63	\$50.90	\$37.16

a. 37.16 per thousand
 so $37.16 \cdot 24 = \$891.84$

b) $\frac{\$891.84}{\text{month}} \cdot 36 \text{ months} = \$32,106.24$
 Total payments

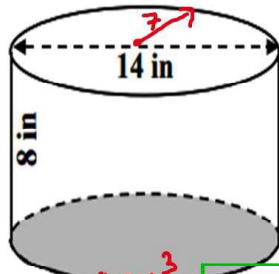
Interest = $32,106.24 - 24,000 = \$8,106.24$

5. Find the volume and surface area of the cylinder

a. Volume: _____ in³

b. Volume: _____ ft³ (tricky!)

c. SA: _____ in²



a) $V = \pi r^2 h = \pi \cdot (7 \text{ in})^2 \cdot 8 \text{ in} = 1,231.50 \text{ in}^3$
 b) $1231.5 \text{ in}^3 \cdot \left(\frac{1 \text{ ft}}{12 \text{ in}}\right)^3 = 0.71 \text{ ft}^3$

c) $SA_{\text{CYL}} = 2\pi r^2 + 2\pi r h$
 $= 2 \cdot \pi \cdot 7^2 + 2 \cdot \pi \cdot 7 \cdot 8$
 $= 98\pi + 112\pi = 210\pi \approx 659.73 \text{ in}^2$ Hint: 12 in = 1 ft

4. Josh wants to take a loan to buy a car. The total cost he is going to finance with a loan is \$24,000. He negotiates an Annual Percentage Rate [APR] of 20% over a term of three years with regular monthly payments. (btw: 20% is a very bad and predatory rate if you are borrowing!)

- c. Josh's favourite uncle says that is silly! He is confident in Josh and trusts him and will loan Josh the \$24,000 at 10% APR compounded monthly and Josh can just pay him back the loan plus interest after five years in one lump sum payment. How much interest does Josh pay to borrow from his uncle? What does Josh's car end up costing overall?

$A = 24,000 \cdot \left(1 + \frac{0.1}{12}\right)^{(3 \cdot 12)} = \$32,356.36$ TOTAL CAR COST

He ends up paying more than if he had just made regular monthly payments at the higher rate!

He pays an extra \$8,356.36 borrowing from uncle.

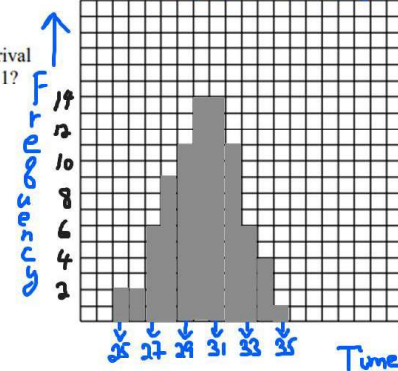
6. Here is a table of some observed bus arrival times at a bus stop.

Bus Arrival Time	08:25	08:26	08:27	08:28	08:29	08:30	08:31	08:32	08:33	08:34	08:35
Frequency	2	2	6	9	11	14	14	11	6	4	1

TOTAL 70 trips

- a. Plot a properly labelled histogram. (scale the vertical axis if necessary)
 b. what percentage of the observed arrival times does the bus arrive at or after 08:31?

Bus arrival times



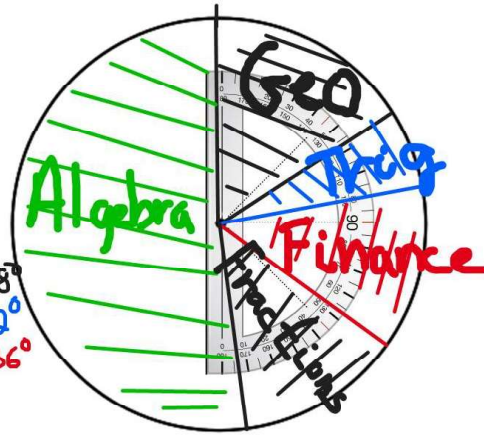
b) $\frac{14+11+6+4+1}{70} = \frac{36}{70} \approx 51\%$ of the times

7. Erick did a survey of students' favourite math subject. Here are his results.

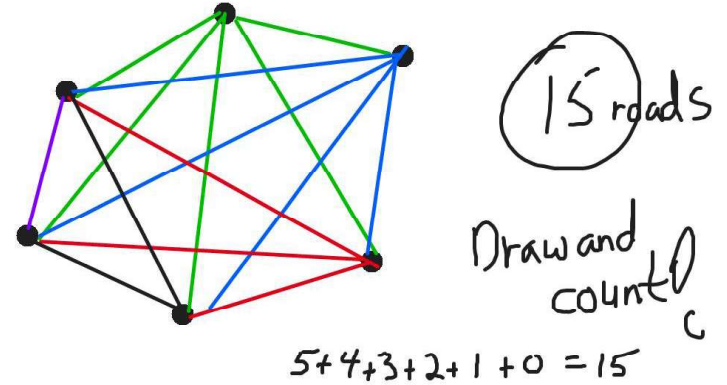
Favourite Subject	Count	%	Degrees
Geometry	8	16%	58°
Trig	3	6%	22°
Finance	5	10%	36°
Fractions	8	16%	58°
Algebra	26	52%	187°
Total:	50		

Geo $\rightarrow 8/50 = 16\%$; $16\% \cdot 360 \approx 58^\circ$
 Trig $\rightarrow 3/50 = 6\%$; $6\% \cdot 360 \approx 22^\circ$
 Fin $\rightarrow 5/50 = 10\%$; $10\% \cdot 360 = 36^\circ$

50 students surveyed



8. There are six rezs (not in a line) that are being connected by roads, each rez to each rez with a separate road. How many roads will there be? [hint: Draw! and/or Use Formula]



9. If three (of the same) pizzas and a \$4 two-litre of coke costs a total of \$41.20. How much does one pizza cost?

Guess and check

one pizza	three pizza	\$4 coke	TOTAL
X \$10?	\$30	+4	34 too low!
X \$15?	15·3 = \$45	+4	\$49 too high!
close \$12?	12·3 = \$36	+4	\$40 close!
12.50?	= 37.50	+4	\$41.50 30¢ too high
12.40	= 37.20	+4	= 41.20 ✓ Yes

\rightarrow one pizza = \$12.40

9. If three (of the same) pizzas and a \$4 two-litre of coke costs a total of \$41.20. How much does one pizza cost?

or work backwards (algebra)

$$3x + 4 = 41.20$$

$$3x = 37.20 \quad \text{Took off the coke}$$

$$x = \frac{37.20}{3} = \$12.40$$

Way easier!

10. Cheryl has two quarters, two dimes, and a nickel. If she randomly selects just two coins how many different sums (amounts) of money can she make?

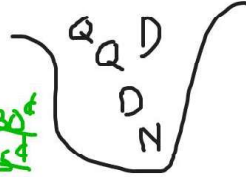
Draw it. List it!

2 coins only!

QQ 50¢
QD 35¢
QN 30¢

DD 20¢
DN 15¢
~~DQ 50¢~~

~~NQ 30¢~~
~~ND 15¢~~



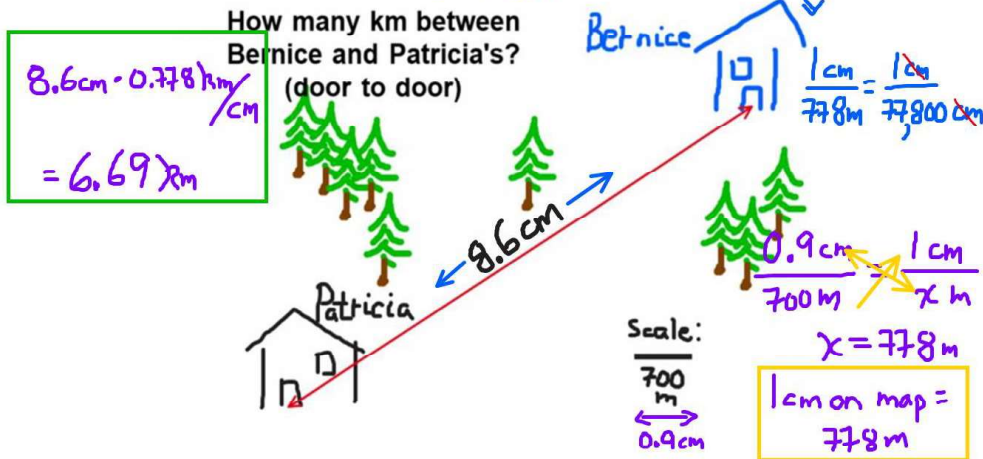
ONLY 5 different amounts she can make

11. If a pizza and **one** can of coke costs \$15 and a pizza and **two** cans of coke costs \$17. Then how much does a pizza cost? [Logic, and/or Work Backwards, and/or Guess and Check]

one pizza	one coke	one pizza + one coke	two cokes	one pizza & 2 cokes
\$10	\$5	\$15	\$10	\$20 Nope
\$12	\$3	\$15	\$6	\$16 Nope
\$13 ✓	\$2 ✓	\$15	\$4	\$17 ✓ Yes

Logic: If one extra can costs an extra \$2 } Logic!
then coke must be \$2 a can!
which means pizza is \$13!
one pizza costs \$13

12. From the map below find the distance from Bernice's house to Patricia's house, **Distance** = 6.69 km. Find the scale as: 1 cm = 0.778 km. Find the scale ratio: 1:77,800 or 778m



13. Complete the Simple Interest table:

$$A = P + I; I = P \cdot r \cdot t$$

A [\$]	I [\$]	P [\$]	r [%/yr]	t [years]
\$12,250	\$2,250	10,000	7.5%	3
\$2,500	500	2,000	10%	2.5 years
\$4,800	800	4,000	40%	0.5

$500 = 2,000 \cdot \frac{10}{100} \cdot t = 200t$; $500 = 200t$; $t = \frac{500}{200} = 2.5$

$800 = 4,000 \cdot r \cdot 0.5$; $800 = 2,000 \cdot r$; $r = \frac{800}{2000} = 0.4 = 40\%$

13. Complete the Simple Interest table:

$$A = P + I$$

A [\$]	I [\$]	P [\$]	r [%/yr]	t [years]
6,000	\$1,500	4,500	$r = 16.67\%$	2
400	0	400	0	5

$$1,500 = 4,500 \cdot r \cdot 2; 1,500 = 9,000 \cdot r; r = \frac{1,500}{9,000} = 16.67\%$$

easy h.o.l

14. Complete the table for Compound Interest using the compound interest formula. Do the last one recursively as well (step by step, year by year).

$$A = P \left(1 + \frac{r}{s}\right)^{n \cdot s}$$

A Total amount [\$]	P Principal [\$]	r APR [%/yr]	Compounding period	n time [years]	I Interest [\$]
a) 10,247.65	5,000	8%	monthly	9 years	\$5,247.65
b) 797.38	750	12%	weekly	6 months	\$47.38

```

5000*(1+0.08/12)
^(9*12)
10247.65118
750*(1+0.12/52)^(0.5*52)
797.3841258
    
```

14. Complete the table for Compound Interest using the compound interest formula. Do the last one recursively as well (step by step, year by year).

A Total amount [\$]	P Principal [\$]	r APR [%/yr]	Compounding period	n time [years]	I Interest [\$]
a) 1,064.03	1,000	1.5%	daily	3 years	\$64.03
b)	4,000	10%	annually	2 years	

a) $A = 1,000 \cdot \left(1 + \frac{0.015}{365}\right)^{3 \cdot 365} = \$1,064.03$

b) $4,000 + 400 = 4,400$ end year 1
 $4,400 + 440 = 4,840$ end year 2
 Check $4,000 \cdot \left(1 + \frac{0.1}{1}\right)^2 = \$4,840$ ✓

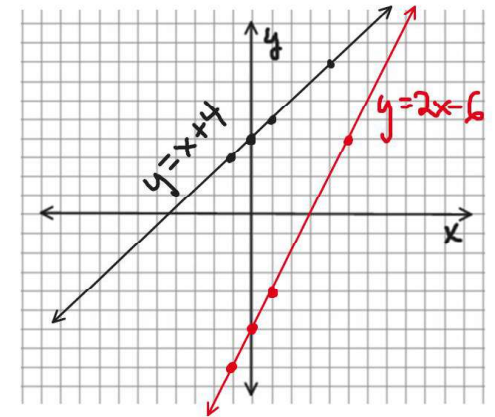
15. Make a table and graph the two lines:

a. $y = x + 4$

x	y	
-1	+3	-1+4
0	4	0+4
1	5	1+4
4	8	4+4

b. $y = 2x - 6$

x	y	
-1	-8	2(-1)-6
0	-6	2(0)-6
1	-4	2(1)-6
5	+4	2(5)-6



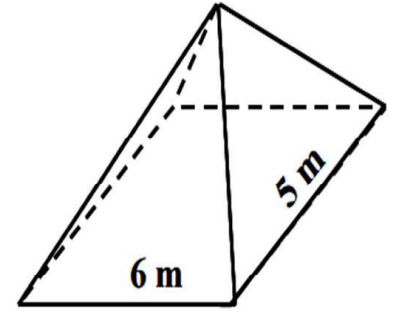
16. Fractions (use a calculator if you really must, hopefully not!)

a. $1\frac{3}{4} * 6 =$ $= \frac{7}{4} \cdot \frac{6}{1} = \frac{42}{4} = 10\frac{1}{2}$	b. $1\frac{3}{4} \div 6 =$ $\frac{7}{4} \cdot \frac{1}{6} = \frac{7}{24}$	c. $1\frac{3}{4} + 6\frac{1}{2} =$ $1 + 6 + \frac{3}{4} + \frac{2}{4} = 7 + \frac{5}{4} = 8\frac{1}{4}$
d. $6\frac{3}{4} - 4\frac{3}{8} =$ $6 - 4 + \frac{6}{8} - \frac{3}{8} = 2\frac{3}{8}$	e. $5 \div 4\frac{3}{8} =$ $\frac{5}{1} \div \frac{35}{8} = \frac{15}{1} \cdot \frac{8}{35}$	f. $\frac{2}{3} * \frac{7}{8} * \frac{3}{7} =$ $\frac{2}{\cancel{3}} \cdot \frac{\cancel{7}}{8} \cdot \frac{3}{\cancel{7}} = \frac{2}{8} = \frac{1}{4}$
	$= \frac{8}{4}$ $= 1\frac{1}{2}$	

BONUS (2 marks if you need them)

Calculate the volume of this rectangular pyramid that is 320 cm high.

↳ careful this is 3.2m



$$\begin{aligned}
 \text{Vol}_{\text{pyramid}} &= \frac{1}{3} \text{Base area} \cdot \text{height}_{\text{obj}} \\
 &= \frac{1}{3} \cdot (5 \cdot 6) \cdot 3.2 \text{m} \\
 &= 32 \text{m}^3 \text{ (cubic metres)}
 \end{aligned}$$

Bonus (2 marks if you need them)

$$5\frac{1}{5} - 2\frac{1}{8} = \text{Texas Instruments TI-83 Plus} \left((5+1/5) - (2+1/8) \right) \text{ Frac} = \frac{123}{40} = 3\frac{3}{40}$$