

**GRADE 12 APPLIED  
COURSE REVIEW  
PRACTICE EXAM QUESTIONS**

**Part 1 - Multiple Choice**

Graphing Calculators or on-line graphing tools are permitted

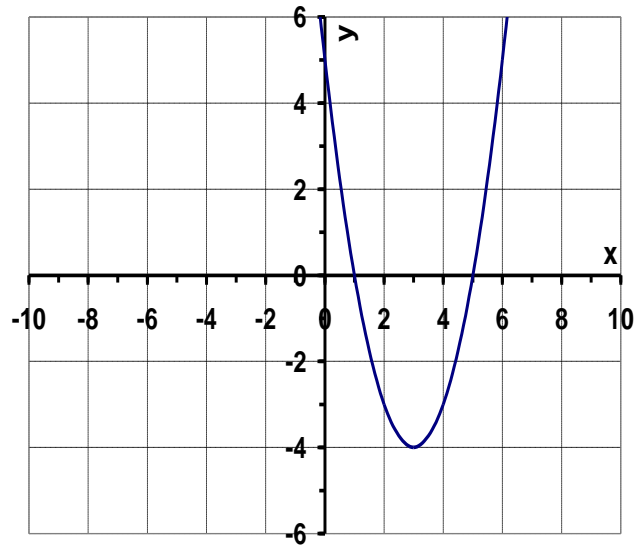
Circle the **best** the letter of the best response (as there are sometimes multiple ways to calculate answers)

A single sheet of Reference Notes is encouraged (mandatory?).

When using a technology tool (graphing, TVM) ensure you show a hand-drawn Screenshot of your entries and solution)

1. The vertex of the parabola at right is:

- a. **(0, 4)**
- b. **(3, -4)**
- c. **(4, -3)**
- d. **no solution**



2. The vertex of the parabola:  $y = 2x^2 - 8x + 4$  is:

- a. **(2, -4)**
- b. **(2, 4)**
- c. **(4, 8)**
- d. **(0, 0)**

3. Kyle found the following temperatures of his coffee as it cooled outside on the steps.

|                               |           |           |           |           |
|-------------------------------|-----------|-----------|-----------|-----------|
| <b>Time M<br/>[Minutes]</b>   | <b>1</b>  | <b>5</b>  | <b>10</b> | <b>20</b> |
| <b>Temperature T<br/>[°C]</b> | <b>68</b> | <b>35</b> | <b>16</b> | <b>3</b>  |

What is a general equation that best models this cooling?

- a.  $T = 80 \cdot 0.85^M$       b.  $T = -3M^2 + 68$
- c.  $T = \text{constant } 68$       d.  $T = M - 20$
4. **4.95% of \$1230** is:
- a. **\$60.89**      b. **\$92.00**      c. **\$248.48**      d. **\$102**  
**exactly**
5. If you invest **\$300** at **10%** compounded **quarterly** how much is your investment worth after **12** years?
- a. **\$981.44**      b. **\$660**      c. **\$30.00**      d. **\$3600.00**
6. You loan your friend **\$200.00** and you charge him simple interest. He pays you back **\$240** after **18** months. What annual interest rate were you charging him?
- a. 15%      b. 10%      c. 13.3%      d. 120%
7. How long does it take an investment of **\$1,000** to become **\$2,500** if it is invested at **6%** annual interest compounded daily?
- a. **6 years**      b. **2.5 years**      c. **15.3 years**      d. **122 months**
8. In how many ways can the letters of the word **WAWANESA** be arranged.
- a. 8      b. 3360      c. 13,440      d. 40,320

9. Two normal six-sided dice are rolled. The probability that their sum is less than 5 [Prob(sum<5)] is:

- a.  $\frac{1}{6}$       b.  $\frac{1}{5}$       c.  $\frac{1}{2}$       d.  $\frac{5}{6}$

10. If you decide to quit smoking and put away \$100 per week into a bank account for 25 years how much money will you have at the end of 25 years? Assume the bank pays 5% interest compounded daily.

- a. \$2587      b. \$258,857  
c. \$130,000      d. less than \$10,000

11. In the question above how much would you have in your bank account if you had quit for 12.5 years?

- a. exactly half as much      b. \$1250  
c. about \$90,000      d. \$65,000

12. 100 ft is the same as how many metres?

- a. 328m      b. 132 m      c. 31m      d. 21.34m

13. If your Aunt gives you \$1,000 for a grad present and says : “put it in the bank until it is double!”. *Approximately* how long will it take for your present to double if you get an annual interest rate (APR) of 8.5% compounded monthly? (*Rule of 72*)

- a. 5 years      b. 8 years      c. 2 years      d. 85 years

14. Cassy found the following temperatures of his coffee as it cooled outside on the steps.

|                               |           |             |            |            |
|-------------------------------|-----------|-------------|------------|------------|
| <b>Time M<br/>[Minutes]</b>   | <b>0</b>  | <b>5</b>    | <b>10</b>  | <b>15</b>  |
| <b>Temperature T<br/>[°C]</b> | <b>90</b> | <b>21.4</b> | <b>5.1</b> | <b>1.2</b> |

What is a general equation that **best** models this cooling? (hint: 'exponential' regression)

- a.  $T = 80 \cdot 0.85^M$     b.  $T = -3M^2 + 68$   
 c.  $T = 90 \cdot 0.75^M$     d.  $T = M - 20$

15. Brandon counted bacteria in a dish using a microscope. Here is a table of his results:

|                         |          |           |           |            |
|-------------------------|----------|-----------|-----------|------------|
| <b>Time 'M' [Hours]</b> | <b>0</b> | <b>6</b>  | <b>12</b> | <b>18</b>  |
| <b>Number 'N'</b>       | <b>5</b> | <b>15</b> | <b>45</b> | <b>133</b> |

- What is a general equation that **best** models this population growth. (*hint*: 'exponential' regression)

- a.  $N = 80 \cdot 0.85^M$                       b.  $N = 5 (1.2)^M$   
 c.  $N = 18 \cdot 133$                          d.  $N = M - 20$

- after two days how many bacteria are likely to be (*best answer*)?

- a. 600      b. 0      c. 31,745      d. 782.3

- after how many hours will there be 266 bacteria (*best answer*)?

- a. one week                      b.  $\frac{266}{5}$  hours  
 c. 36 hours                        d. 22 hours

16. The solution(s) to the equation  $4\sin(0.5\theta - 1^\circ) + 3 = 5$  in the domain 0 to  $2\pi$  are:

- a. 55 degrees    b. 3.04 radians    c.  $\pi^r$     d. no solution

17. The trigonometric function  $f(x) = 12 \sin(3t + 2^\circ) - 4$  has (t is time in seconds)

- a. a median of : (a) -4    (b) 12    (c)  $3x$     (d) its asymptote  
 b. a maximum of : (a) 12    (b) 8    (c) -16    (d) 3  
 c. a period, T, of (a) 12 sec    (b) 3 sec    (c) 2.09 sec    (d) 2 rads

18. if  $3x^2 + 4x + 7 = 5$  then  $x = ?$

- a. no solution    b. a vertical transgrobulation    c. 5    d. 2

19. Karen has a retirement fund of \$240,000. It is in her account compounding monthly at 5.6%. She is 67 years old and retiring now. She wants to draw down on her retirement savings till she is 85 with a monthly annuity. The amount she will be able to withdraw monthly until the retirement is depleted down to zero is:

- a. \$1766.02    b. \$13,932.24    c. \$646.02    d. \$656,087.53

20. Determine the local maximum of the cubic equation  $y = 0.5x^3 - 6x$

- a. (-2,8)    b. (8, -2)    c. (2, -8)    d. (-8, 2)

21. The function  $f(x) = -2x^2 + 10$  has a **range** of :

- a.  $\{ 10 < f(x) < -10 \}$     b.  $\{ -\infty \leq f(x) < \infty \}$   
 c.  $\{ -\infty < x < \infty \}$     d.  $\{ -\infty < f(x) \leq 10 \}$

22. The surface area of an entire cylinder that is 3.5 metres high and 75 cm diameter is:

- a. 262.5                      b.  $\sim 91,000 \text{ cm}^3$   
c. 9.13 square meters      d.  $9,660 \text{ m}^2$

**GRADE 12 APPLIED  
EXAM REVIEW  
OPEN RESPONSE**

Answers to at least two decimal places unless otherwise indicated.

1. Accurately graph the equation for the domain  $\{-3 \leq x \leq 6\}$

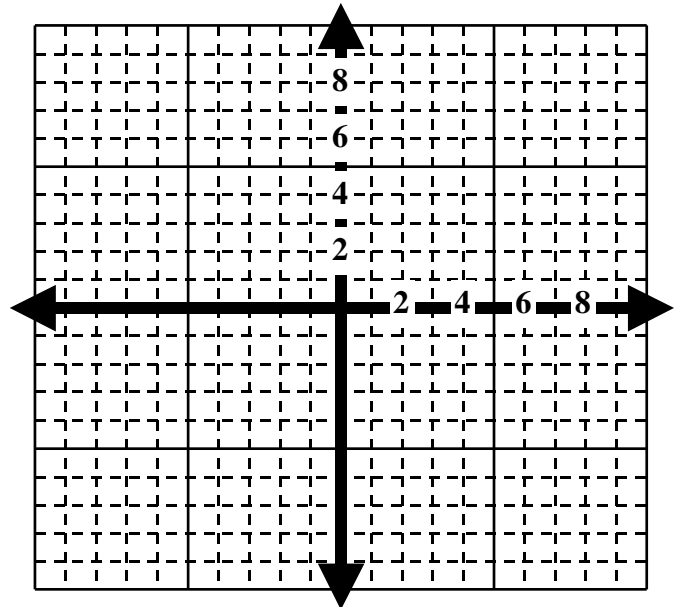
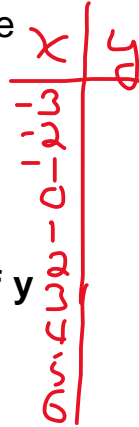
$$y = 0.1 * 2^x$$

- a. what is the **value of y** when  $x = 4$ ?

- b. what is the **range** of the y for the function?

- c. state the **y-intercept**?

- d. at what value of x does **y = 4**?



2. Terrance was counting bacteria in a petrie dish in biology class. There were initially **100** bacteria when he started his stop watch and he kept the following table of data for several days:

|               |            |            |            |             |
|---------------|------------|------------|------------|-------------|
| <b>Hours</b>  | <b>0</b>   | <b>4</b>   | <b>8</b>   | <b>20</b>   |
| <b>Number</b> | <b>100</b> | <b>200</b> | <b>400</b> | <b>3200</b> |

- a. Determine the exponential equation that best models the bacteria growth
- b. Determine how many bacteria there were **after** exactly **10** hours.
- c. how long would it take for there to be exactly **1000** bacteria?

3. You have a Canada Savings Bond (CSB) for \$500. It pays 6% simple interest. You have had it for 15 years, how much is it worth now?



4. You invest \$1,000 at 12% interest compounded monthly. How much is it worth after six years? [Use manual formula and TVM App]

5. You had an investment that earned \$240 interest on a principal of \$800 after 5 years.

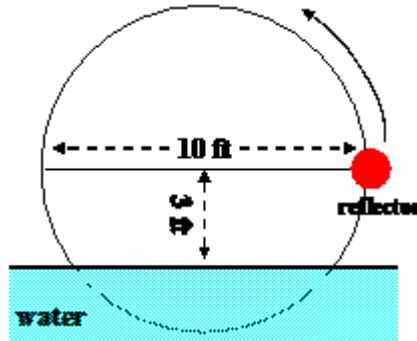
What was the interest rate if the interest was simple interest?

6. Manitoba License plates are generally three letters followed by digits. How many license plates can be made if the third letter must be an E and the three digit number must be greater than 300? [A toughy?]

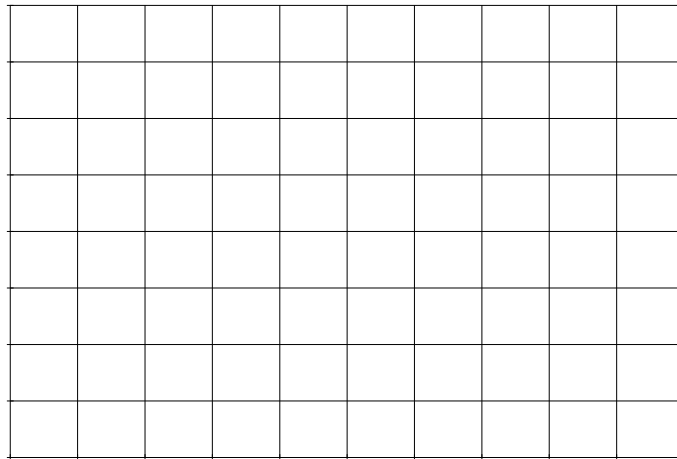


8. A person tosses a fair coin three times.
- Create the sample space to show this.
  - Let Event A be throwing exactly one head from the three coin tosses. What is the probability of event A [ie:  $\text{Prob}(A)$ ]
  - What is the probability of the *complement* of Event A (ie:  $\text{Prob}(\bar{A})$ )?
9. How many ways can you arrange all the letters of the word 'HOWDY'?
10. Two swimmers, Ann and Betty, are attempting to swim around Hecla Island. Event A is the a success for Ann; event B is a success for Betty. Their probabilities of success are  $P(A) = 0.2$  and  $P(B) = 0.3$ .
- what is the probability that both swimmers succeed?
  - A certain student calculates that the probability of at least one of the swimmers succeeding is:  $P(\text{At least one success}) = P(A) + P(B) = 0.5$ . Explain why this is incorrect and calculate the correct answer.

11. **Sinusoidal Functions.** You notice that a paddlewheel boat has a reflector on the circumference of the wheel as shown in the diagram. Three seconds later the reflector reaches its maximum height. The height of the reflector,  $h$ , in feet varies sinusoidally with time,  $t$ , in seconds and completes a cycle every 12 seconds.



- a. draw a graph below of the height of the reflector as a function of time for at least one complete cycle. Completely label the graph neatly and correctly.



- b. determine an equation for the sinusoidal function in the general form  $y = a \sin(bx + c) + d$ . [Work in silly earthling degrees]

12. The teacher has three prize coupons for his class of ten. One is for a burger, one is for a drink, and one is for fries. The teacher awards the coupons to three separate students randomly by drawing names from a hat.

a. In how many ways can teacher award the prizes.

b. Kelly is one of the students, he loves his fries! What is the probability he will get a French fry coupon.

c. If the teacher had thrown names back in the hat after drawing for each coupon instead, what is the probability that just one particular student, Cassandra wins **all three** prizes.

13. In a five card poker hand from a single deck of cards:

a. how many ways can you make 4 of a kind?

b. what is the probability you will be dealt a four of a kind?

14. Selecting two marbles from a jar *without replacement*. There are four green marbles and one red marble.

a. What is the probability you draw a green marble on the first draw then a red marble on the second?

b. what is the probability of drawing a green and red marble (in any order).

c. What is the probability of selecting two red marbles?

d. What is the probability of drawing no red marble in either draw.

15. How many distinguishable ways can you arrange all the letters of the words:

a. CASSANDRA

b. SHYNIA

c. TIANNA

d. HARRY

16. How many distinguishable ways can you arrange all of the letters in the word "MATHEMATICS" if the S must be first?

17. What is the probability in one draw from a deck of cards of selecting a Red Queen?

18. What is the probability of selecting a Queen **or** a Heart from a single deck of cards in one draw?

19. At the races. A wonderful day out a Assiniboia Downs!

a. How many different outcomes can occur for first, second and third place in a horse race if there are eight horses racing.

b. What is the probability that you will select the correct three horses that place in the same winning order 1<sup>st</sup>, 2<sup>nd</sup>, third if you only make one bet (this is called a 'trifecta' at the race track). (assume all the outcomes are equally likely, each horse is equally likely to win)

c. What is the probability that when you select two horses only that they will come in 1<sup>st</sup> place and second place (in either order)? (this is called a *Quinella* at the race track, assume each horse is equally likely to win still)

20. Lisa would like to deposit her income tax refund in an account earning **4.6%** annual interest compounded monthly. She will withdraw her money at the end of **5 months**. If her income tax return was **\$398.00**, what will her balance be in the account at that time? (*Hint*: 5 months = 5/12ths of a year)

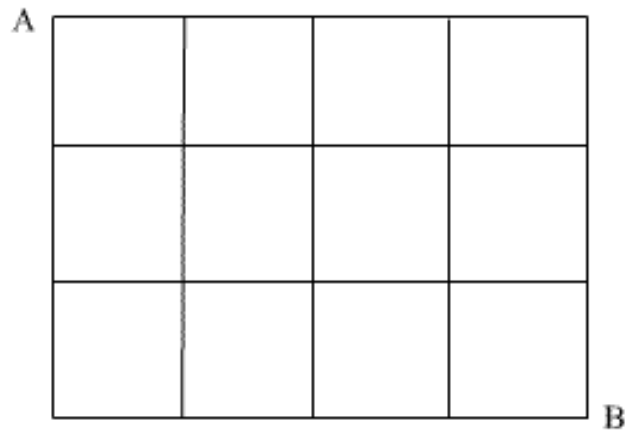


21. A grand-parent of a new born child decided to invest **\$5,000** in a GIC for the child that pays interest at the rate of **6% APR** compounded semi-annually. The GIC was bought the day the child was born. What compound amount will the child have at age 21 on his 21<sup>st</sup> birthday?

22. How much money would have to be invested now ('PRESENT VALUE') in order to amount to **\$6000** in three years if invested at **5 ¾** percent compounded monthly?

23. How long will it take **\$4500** to double if invested at **8 ½** percent compounded annually?

24. How many ways are there to go from A to B if you may go only right or down?



25. An experiment consists of drawing a single card from an ordinary deck of 52 cards. Give the following probabilities: [each of these are separate trials where the card has been **replaced**]

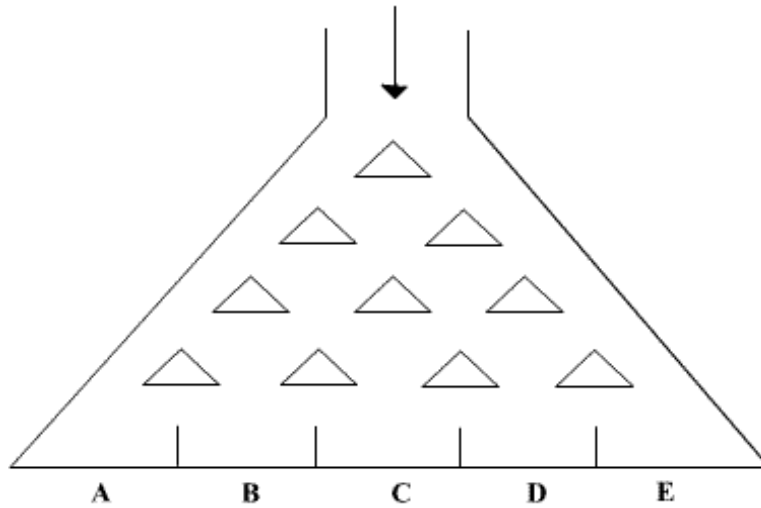
- a)  $P(\text{drawing an ace})$
- b)  $P(\text{drawing a heart})$
- c)  $P(\text{drawing a heart **or** a spade})$
- d)  $P(\text{drawing the king of hearts})$
- e)  $P(\text{drawing a heart **or** a king})$
- f)  $P(\text{**not** drawing a king})$

26. A number is chosen at random from the first **20** positive integers. What is the probability that:

- a) it is prime or a perfect square
- b) it is even and a perfect square
- c) it is prime and a perfect square
- d) it is odd and a perfect square
- e) it is odd OR a perfect square

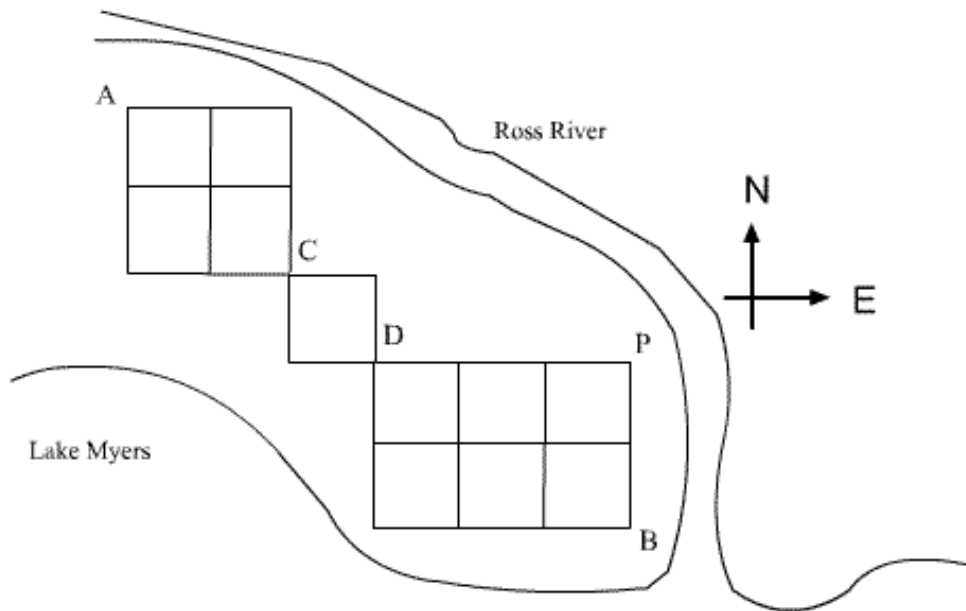
27. A ball is dropped into the top of the PLINKO game. Each time it strikes a pin (triangle), it is **equally likely** to go to the left or right. The ball will continue downwards until it stops in one of the slots A to E.

- What is the probability that the ball will come to rest in slot A?
- What is the probability that the ball will come to rest in slot B?
- What is the probability that the ball will come to rest in slot E?



28. **Advanced Question.** Answer the same questions above if the ball is rigged so it favours bouncing to the right 80% of the time?

29. The diagram shows a road grid in the town of Esker. The roads are restricted by a river on one side and a lake on the other. **Anson** lives at point **A** and his friend **Bettina** lives at point **B**. Anson visits Bettina frequently, and likes to take a different route each time.



Anson stays on the roads and travels only south and east. How many routes are there from:

- A to B?
- A to B if he must go through point P?
- What is the **probability** that Anson will have gone through point P if all routes are randomly chosen?

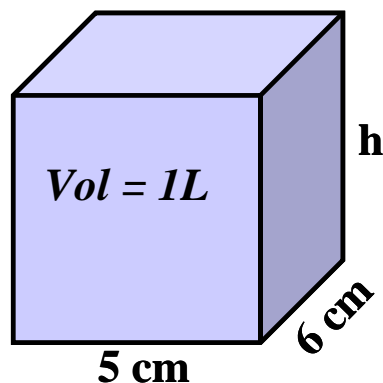
30. Your room is 14 ft **by** 12 ft and the walls are 8 feet high. You have a single window that is 4 feet high and 80 inches wide and a door that is 4 feet wide by 7 feet tall. . You need to paint the walls with two coats of paint.

a. How much surface area do you need to paint?

b. if a one litre can of paint covers 12 square metres, how many cans of paint do you need?

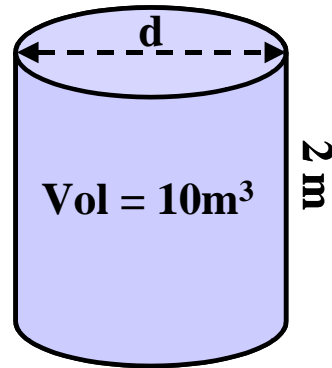
c. how much will you spend on paint if paint costs \$7.85 a can and you have GST of 5% and PST of 8%?

31. What is the height,  $h$ , of this rectangular prism (ie: box)?



$$\text{Vol}_{\text{Prism}} = l * w * h$$

32. What is the diameter of this cylinder?



$$\text{Vol}_{\text{cyl}} = \pi * r^2 * h$$

33. You have to paint a fuel tank! It is an upright cylinder. It is **4m** high and has a diameter of **3m**. It takes two coats of paint. You do not paint the bottom. One can of paint covers **12m<sup>2</sup>**. How many cans of paint do you need?

$$\text{SA}_{\text{cyl}} = 2\pi r^2 + 2\pi rh$$

34. Complete the empty white table blanks:

| <b>Degrees</b> | <b>Exact Radians</b> | <b>Decimal radians<br/>(three decimal places)</b> |
|----------------|----------------------|---|
| 30°            |                      |   |
| 120°           |                      |   |
|                |                      | <b>3<sup>r</sup></b>                              |
|                | $\frac{3\pi}{2}$     |   |
| 109°           |                      |   |
|                |                      | <b>8<sup>r</sup></b>                              |
|                | $\frac{7\pi^r}{9}$   |   |
|                | $\frac{\pi^r}{18}$   |   |
| 360°           |                      |   |
| 245°           |                      |   |
|                | $\frac{5\pi^r}{4}$   |   |

35. Ron and Deb are planning on buying a house. They think they can afford \$1,200 per month for the mortgage. They have saved up \$20,000 for a down payment. They will likely finance the mortgage at 3.5%, compounded monthly, for 25 years. What price house will they be able to afford. Disregard taxes, it is a pre-owned house and pre-owned homes are not taxed.

Ans: ~\$259,700 (don't forget they have the down payment too!)

36. Kyle and Wanda are looking to buy a home and want to apply for a loan. The home they want has annual heating bills of \$2600/year, the property taxes on that street are about \$3800/ year. Their monthly gross income is \$5600. The mortgage will likely cost about \$1200 / month at current interest rates. Determine their GDSR. Are they likely to get the loan?

Ans: 30.95%. They will likely get the loan since it is below 32% , however there are new 'Stress Tests' the government has inacted where you have to allow for a2% increase in mortgage rates.

37. Given the following data determine a best fit cubic equation in the general form:

$$y = ax^3+bx^2+cx+d:$$

|       |    |   |    |   |    |
|-------|----|---|----|---|----|
| $x_1$ | -2 | 0 | 1  | 2 | 3  |
| $y_1$ | -8 | 0 | -2 | 8 | 42 |

Ans:  $y = 2x^3-4x$

39. Teacher sends Daryl to the store for 20 donuts with \$45. Maple and/or Chocolate donuts. Maple Donuts cost \$3 each, chocolate cost \$2 each. Daryl has to spend all the money, how many of each donut will he get?

Ans: 5 Maple, 15 Chocolate



40. Mike shoots an arrow into the air. The height is given by the function  $h(t) = -5t^2 + 70t + 2$ ; where height,  $h$ , is measured in metres and time,  $t$ , in seconds.

- determine the time at which the arrow reaches its maximum height
- determine the maximum height the arrow reaches
- determine at what time the arrow hits the ground.
- determine the time(s) that the arrow is 100m above the ground.

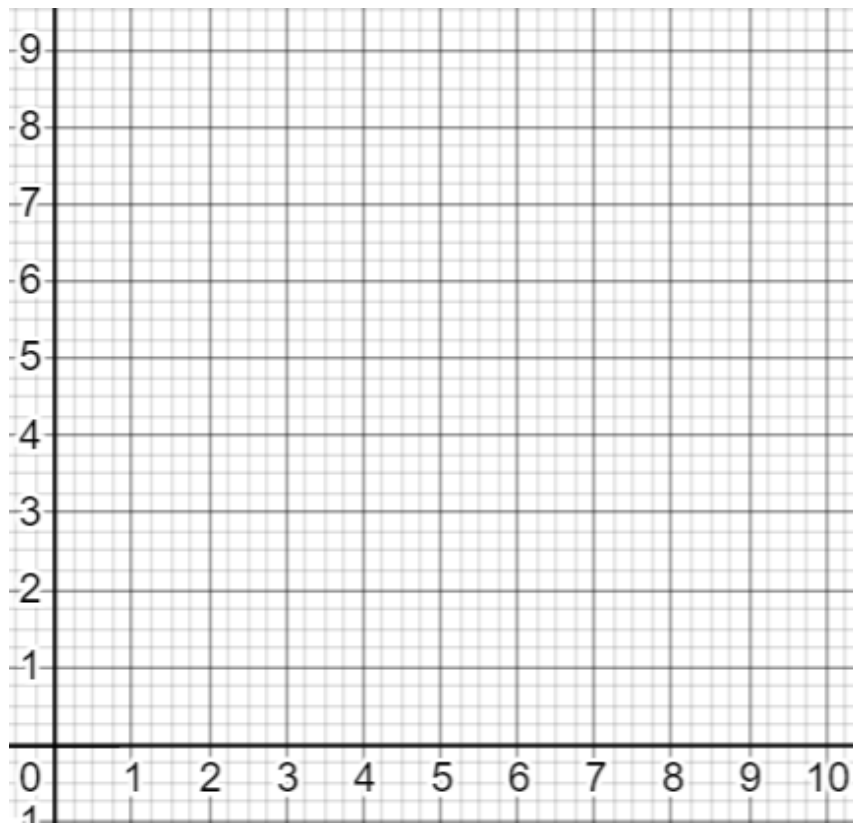
ANS: a. 7 secs      b. 247 metres up  
c. 14.03 seconds      d. 1.58 seconds, 12.42 seconds

41. Determine the mean, median, mode, and range of the following data:

{2, 5, 6, 6, 7, 8, 9, 4, 6, 3, 9}

Ans: Mean:5.91; Median: 6; mode: 6; range: 7

42. Make a histogram of the data: {2, 5, 6, 6, 7, 8, 9, 4, 6, 3, 9}



43. If Kirk gets a 75% mean on his entire math course his mom will take him to Fun Mountain! Presently Kirk has test marks of 65%; 80%, 90%, and 55% and there is one more test remaining. All the test marks on the course are equally weighted. What mark does Kirk need on his final (fifth) test to get to Fun Mountain?

44. In Jody's English course there are five tests and a final exam. For course assessment the final exam has a weight factor of twice that of the tests. On her tests Jody got [%]: 70, 67, 70, 75, and 80. On her final exam she only got a 52.

- a. what is Jody's mark for the course using the assessment weightings?
- b. what was Jodie's mean mark before the exam?

45. Problem Solving (Guess and Check, Work Backwards, Use Logic).  
Five years ago my mom was twice as old as me. I am 24 now. How old is my mom now?

46. Bruce wants to get into the illustrious Klutz Business Program at university. The program has a cut off for acceptance. They only accept candidates in the top 60% based on an entrance exam. The marks are posted later (by private applicant number) on a bulletin board. Bruce got a score of 66 out 80 possible marks. He notices that a total of 265 students wrote the exam. He notices that 106 students had a mark lower than he, three other students had the same mark as he, and the remainder all had a better mark.

- a. calculate Bruce's percentage mark on his exam;
- b. sketch a number line picture of the distribution of all the applicant marks [%]
- c. calculate Bruce's Percentile Rank d. explain if Bruce will be accepted into the program.
- d. If the 80th percentile cut off (P80) was at an exam score of 92% determine how many students had an exam score better than 92%. f. Bonus. If the 90 th percentile cut off was at an exam mark percentage of 96%, explain what that tells you about the marks and the applicants and the course.

47. Lance is on a hockey team. The coach measures the height of all 26 members of the team. Lance and two others have a height of 165 cm. Seven team members are taller.

- a. What is Lance's percentile rank?
- b. What percentage of the team is shorter than Lance.

48. A tour boat experiments with their pricing during their last 6 day cruises. The results are in the table below:

|                |    |    |    |    |    |    |
|----------------|----|----|----|----|----|----|
| Price (\$)     | 10 | 15 | 18 | 25 | 30 | 40 |
| # Tickets Sold | 50 | 40 | 35 | 25 | 20 | 8  |
| Revenue        |    |    |    |    |    |    |

- Fill in the revenue portion of the table.
- Using the Price and the Revenue, find the quadratic regression equation.
- What price maximizes the revenue? What is the maximum revenue?
- What factors, other than price, may affect ticket sales?

49. A cannon shoots a cannonball! The cannonball's height after being shot is given by the following formula:

$$h = -4.9t^2 + 100t + 50$$

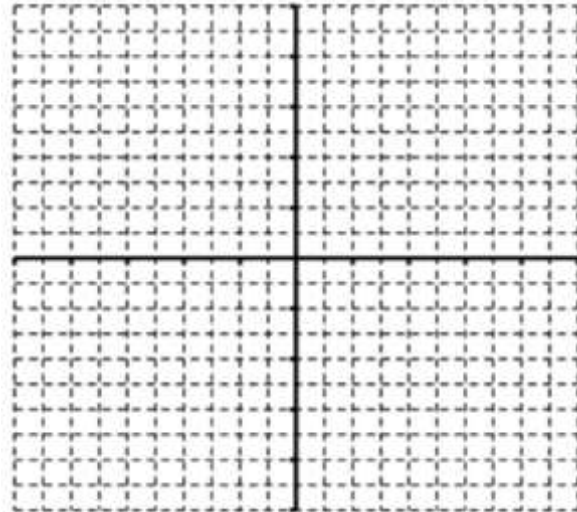
where **h** represents height in metres and **t** represents the number of seconds.

- From what initial height is the cannonball fired?
- When** does the cannonball reach a maximum height? **What** is the maximum height?
- How many seconds is the cannonball above a height of 300 m?
- How long is the cannonball in the air?

50. Consider the cubic function  
 $y = 2x^3 + 8x^2 - 22x - 60$ .

- What are the coordinates of the relative maximum and minimum points?
- What are the coordinates of the x-intercepts?
- What are the coordinates of the y-intercept?
- Discuss the end behavior.
- Graph the function. Label all key points found in a) – c).

(you will need to re-scale the y-axis for it all to fit)



51. Your nephew, when he was born, weighed 2.4 kg. The hospital has been kept track of the weight of the last 256 babies and there were 30 babies smaller than your nephew; five others were the same weight.

- What percentile rank is your nephew?
- How many newborns, of the 256, are heavier than your nephew?