

Grade 12 Applied

Week 8 Quiz

Optional

GRADE 12 APPLIED
WEEKLY QUIZ WEEK 8 (OPTIONAL)

Name: _____
Date: _____

SUBMIT by 09:30 MONDAY! By hand; by scan, send, ...

This is an optional quiz.

- Designed to elevate those with a lower overall mark by ~3 to 5%.
- Those with a better mark it will just 'lock-in' the better mark even stronger.
- Those who do not do the quiz (or do worse than their current course average) their overall mark will not be affected.

Show work for each question. Simply stating an answer gets zero marks. If a simple statement of the answer is sufficient the question will clearly say so.

Each individual question is worth two marks unless otherwise indicated.

Round all decimal and percent answers to nearest 0.01 unless otherwise indicated.

Take-home. So obviously Open Book!

1. If there are 14 runners entered in a race, in how many ways can first, second, and third place prizes be awarded?

$${}_{14}P_3 \equiv {}_n P_r(14, 3)$$

$$= {}_n \text{Pr}(14, 3)$$

That was easy!

×

$$= 2184$$

2,184 ways

~~14 nPr 3~~

2184

Clearly an ordered arrangement of runners! So a

PERMUTATION

OR maybe you prefer F.C.P.?

Choices

$$\frac{14}{1^{\text{st}}} \cdot \frac{13}{2^{\text{nd}}} \cdot \frac{12}{3^{\text{rd}}} = 2184$$

2. How many distinguishable arrangements are there of all the letters in the words:

a. BANNOCK

$$\frac{7!}{2!}$$

×

= 2520 WAYS
to distinguishably
arrange the
letters!

That
was
easy

7! if all the letters
different; but
2! ways to juggle around
the 2 "N"s.

b. OGOPOGO

$$\frac{7!}{4!2!} =$$

$$\frac{7!}{4!2!}$$

~~420~~ 105 WAYS

7! if all the letters
different; but
4! = 24 ways to juggle
around the identical "O"s
and 2! = 2 ways to juggle
around the "G"s.

3. If MrF has a class of 10 students and he must select a group of three of them to go upstairs to set up chairs, calculate how many different groups he can select.

$$nCr(10,4)$$

An un-ordered arrangement = 210

groups

$$\frac{10!}{(10-4)!4!}$$

If you have no nCr button on your calculator

$$= 210$$

$$\frac{(10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1)}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

If you have no factorial button on your calculator

$$= 210$$

In the old days we used tables of values that were calculated for us!

Combinations Formula – Table. ${}_n C_r$

| nCr | r | | | | | | | | | | | | |
|-------|-----|----|-----|-----|-------|-------|-------|-----|-----|----|----|----|----|
| n | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | |
| 1 | 1 | 1 | | | | | | | | | | | |
| 2 | 1 | 2 | 1 | | | | | | | | | | |
| 3 | 1 | 3 | 3 | 1 | | | | | | | | | |
| 4 | 1 | 4 | 6 | 4 | 1 | | | | | | | | |
| 5 | 1 | 5 | 10 | 10 | 5 | 1 | | | | | | | |
| 6 | 1 | 6 | 15 | 20 | 15 | 6 | 1 | | | | | | |
| 7 | 1 | 7 | 21 | 35 | 35 | 21 | 7 | 1 | | | | | |
| 8 | 1 | 8 | 28 | 56 | 70 | 56 | 28 | 8 | 1 | | | | |
| 9 | 1 | 9 | 36 | 84 | 126 | 126 | 84 | 36 | 9 | 1 | | | |
| 10 | 1 | 10 | 45 | 120 | 210 | 252 | 210 | 120 | 45 | 10 | 1 | | |
| 11 | 1 | 11 | 55 | 165 | 330 | 462 | 330 | 165 | 55 | 11 | 11 | 1 | |
| 12 | 1 | 12 | 66 | 220 | 495 | 792 | 495 | 220 | 66 | 12 | 12 | 12 | 1 |
| 13 | 1 | 13 | 78 | 286 | 715 | 1,287 | 715 | 286 | 78 | 13 | 13 | 13 | 13 |
| 14 | 1 | 14 | 91 | 364 | 1,001 | 2,002 | 1,001 | 364 | 91 | 14 | 14 | 14 | 14 |
| 15 | 1 | 15 | 105 | 455 | 1,365 | 3,003 | 1,365 | 455 | 105 | 15 | 15 | 15 | 15 |

$10C_4 = 210$

Too bad we seldom use tables anymore, you could see patterns and relationships!

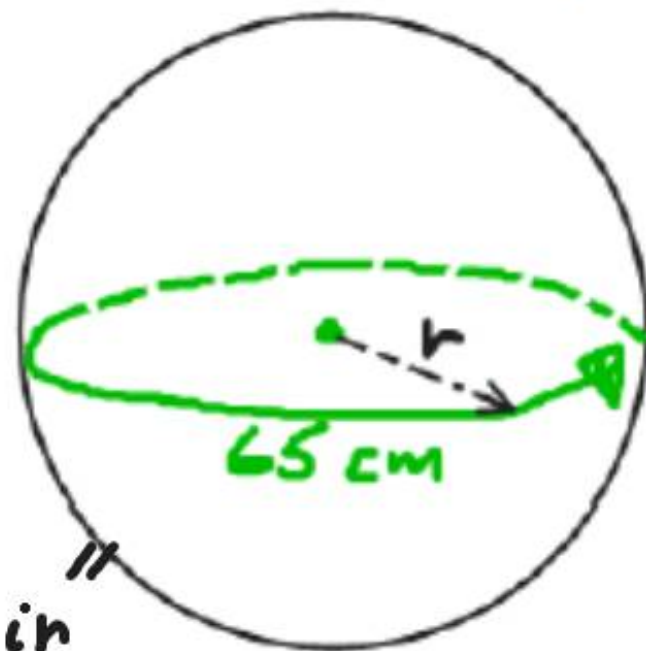
nC

210

r

4. A ball has a circumference of 65 cm. Determine the ball's radius, to the nearest tenth of a cm.

There is only one formula for circumference with 'radius' in it!



Write it down!

$$C = 2\pi r$$

Now "plug in" known values

$$\frac{65 \text{ cm}}{2 \cdot \pi} = \frac{\cancel{2} \cdot \cancel{\pi} \cdot r}{\cancel{2} \cdot \cancel{\pi}}$$
$$\frac{65 \text{ cm}}{(2 \cdot \pi)} = r = \frac{65}{(2\pi)}$$

unknown! Solve with algebra!

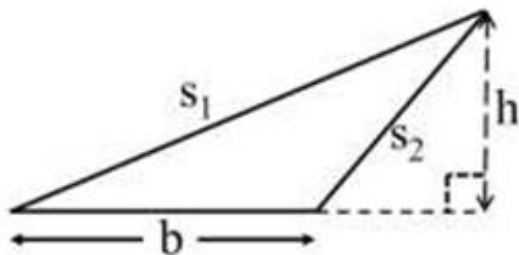
$$= 10.35 \text{ cm} \checkmark$$

$$= 10.345071$$

Check? $2 \cdot \pi \cdot 10.35 = 65.03 \checkmark$

(acute, obtuse, or right)
(scalene, isosceles,
equilateral)

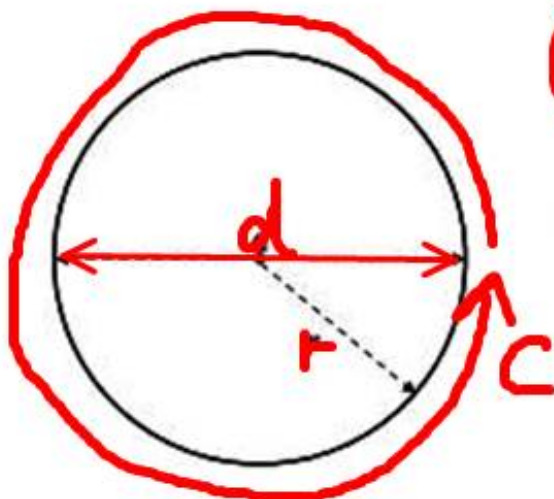
Note
b is always \perp to h



Area; A:

$$A = \frac{1}{2} * b * h$$

Circle



Circumference; C:

$$C = \pi d = 2\pi r$$

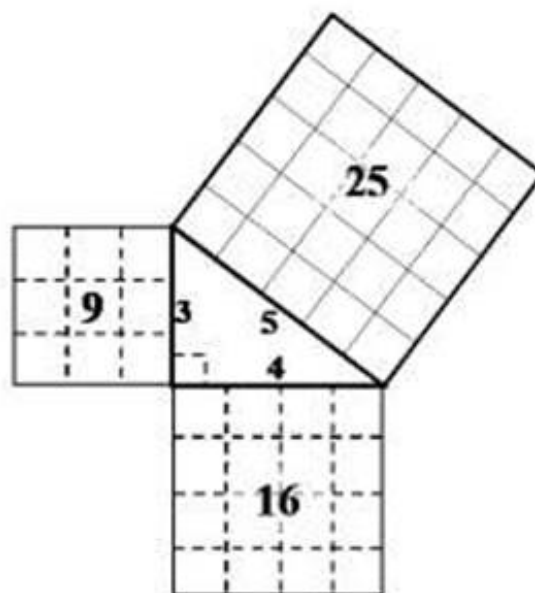
Area; A

$$A = \pi r^2$$

Pythagoras

$$c^2 = a^2 + b^2$$

where *c* is the length of the
hypotenuse and *a* and *b*
are the lengths of the
shorter two sides



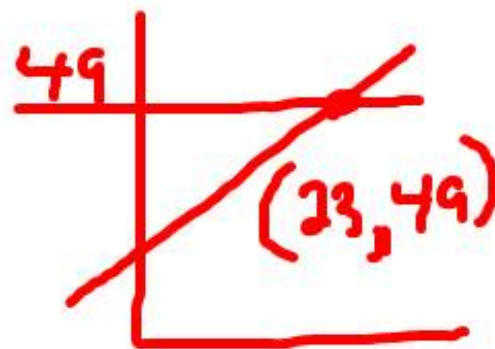
You will
always be
given
Geometric
Formulas

5. Given that $2x + 3 = 49$, showing the proper algebra method, determine the value of x . [ie: 'Solve for x '] [2 pizzas plus + \$3 coke costs \$49]

**Algebra is quick, accurate,
convenient and**

expeditious!

$$\begin{array}{r} 2x + 3 = 49 \\ \underline{-3} \quad \quad \underline{-3} \\ \hline \cancel{2}x = 46 \\ \underline{\quad} \quad \underline{\quad} \\ \hline x = 23 \end{array}$$



So 2 of the x was 46
before the 3 had been
added.

Check: $2(23) + 3 = 46 + 3 = 49$ ✓ Yes

↑
the solution
 $x = 23$

Of course Guess and
check would work
and so would
Graphing

6. When Dennis turns 21, his parents give him money that they had invested for him when he was born. They invested the money in a savings account that had an interest rate of 7.2% compounded daily. If they give him \$22,675.59, how much had they initially invested 21 years before? [Show a hand-drawn screenshot of your TVM App entries and solution]

Mode End Beginning

Present Value

Payments

Future Value

Annual Rate (%)

Periods $\rightarrow 365 \cdot 21$

Compounding

The parent had invested \$5,000

or use formula

$$22,675.59 = P \cdot \left[\left(1 + \frac{0.072}{365} \right)^{(21 \cdot 365)} \right]$$

$$22,675.59 = P \cdot 4.535117038$$

$$\therefore P = \frac{22,675.59}{4.535117038} = \text{\$5,000}$$

Mental Check! 7.2%, should double every 10 years, so 20 yr is 2 doublings

$$5000 \cdot 2 \cdot 2 = 20,000$$

so 21 yr is a bit more \checkmark TLAR

7. Danny deposits \$100 monthly in a retirement fund at the end of every month. His bank offers an interest rate of 5.2%, compounded monthly. If he plans on retiring in 14 years, find:

- Determine how much his investment will be worth when he is ready to retire.
- Determine how much interest his investment earns over the 14 years.

[Show a hand-drawn screenshot of your TVM App entries and solution]

Mode End Beginning

Present Value

Payments

a) Future Value

Annual Rate (%)

Periods *14 yr · 12 pd/yr*

Compounding

Regular monthly deposits (annuities)

b) He deposited
 $14 \cdot 12 = 168$ payments of \$100
 $168 \text{ periods} \cdot \$100/\text{pd} = \$16,800$
 $\therefore 24,638.77 \leftarrow$ Bank gives him
 $-16,800.00 \leftarrow$ He put in
 $\hline \$7,838.77$ Interest Paid by Bank

8. Given the function $f(x) = 150 \cdot 2^x$; using a graphing tool

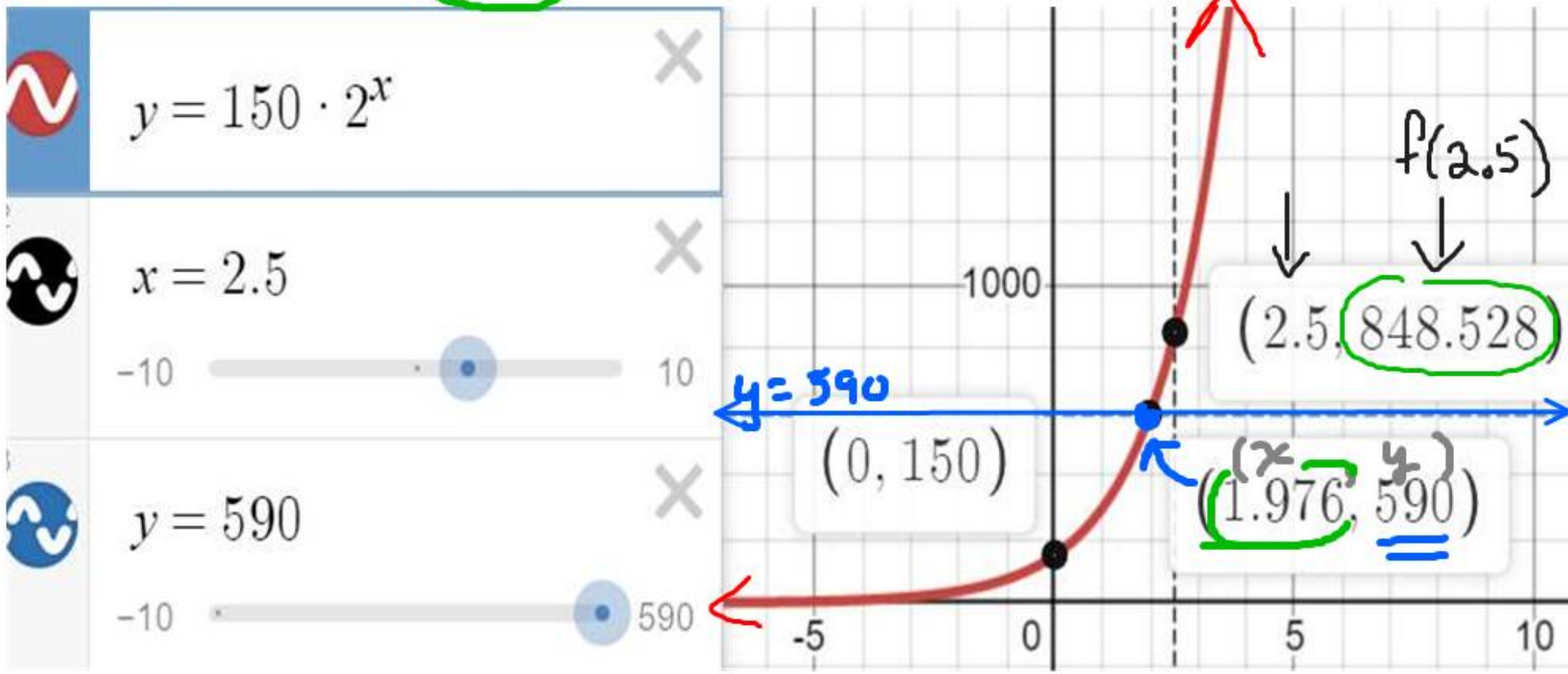


a. State the Domain: $\{ \text{any } x \mid -\infty < x < \infty \}$

b. State the Range: $\{ 0 < f(x) < \infty \}$
 "any value above zero"

c. Evaluate the function for $x = 2.5$ [ie: determine $f(2.5)$] and state the answer: $f(2.5) = 848.53$
 or "plug in" $y = 150 \cdot 2^{2.5}$
 read graph

d. Solve for x : $590 = 150 \cdot 2^x$. State the solution(s)
 $x = 1.976 = 1.98$ ✓ Check! $150 \cdot 2^{1.976} = 590.10$ ✓
 $y = 848.5281$



9. For the following quadratic function:

$$f(x) = -1x^2 + 4x + 5$$

a. Make a representative sketch of the function. Significant points should be in correct quadrants. ✓

b. State the Domain and the Range

every possible x

$$\{ -\infty < x < +\infty \}$$

$$\{ -\infty < f(x) \leq 9 \}$$

c. Indicate on the sketch and state the following.

→ Vertex: $(\frac{2}{x}, \frac{9}{y})$

Axis of Symmetry: $x = 2$

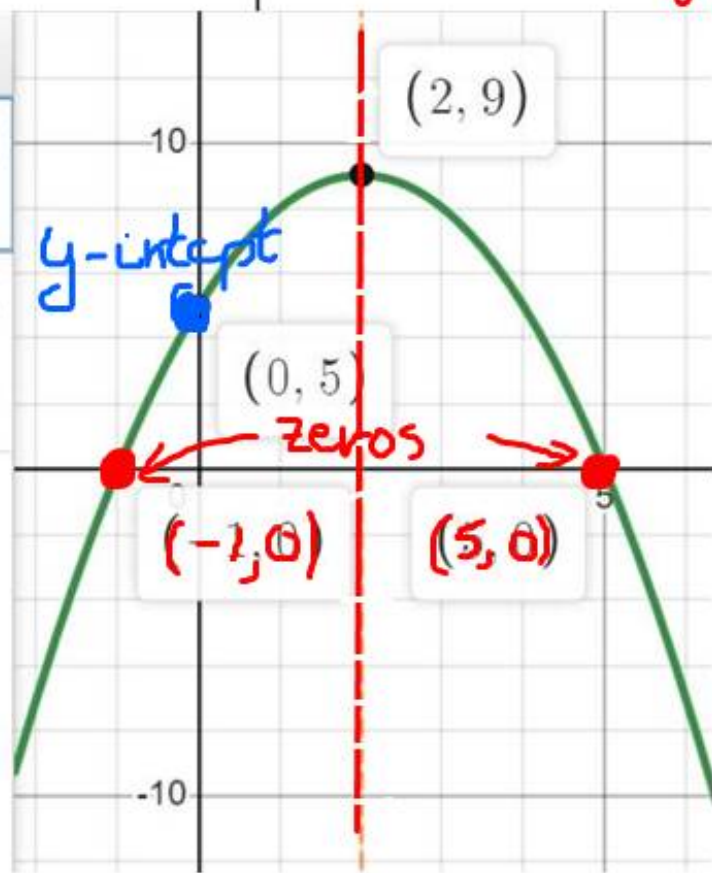
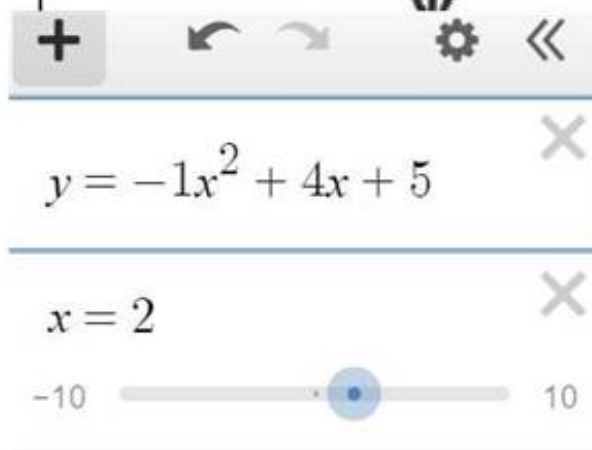
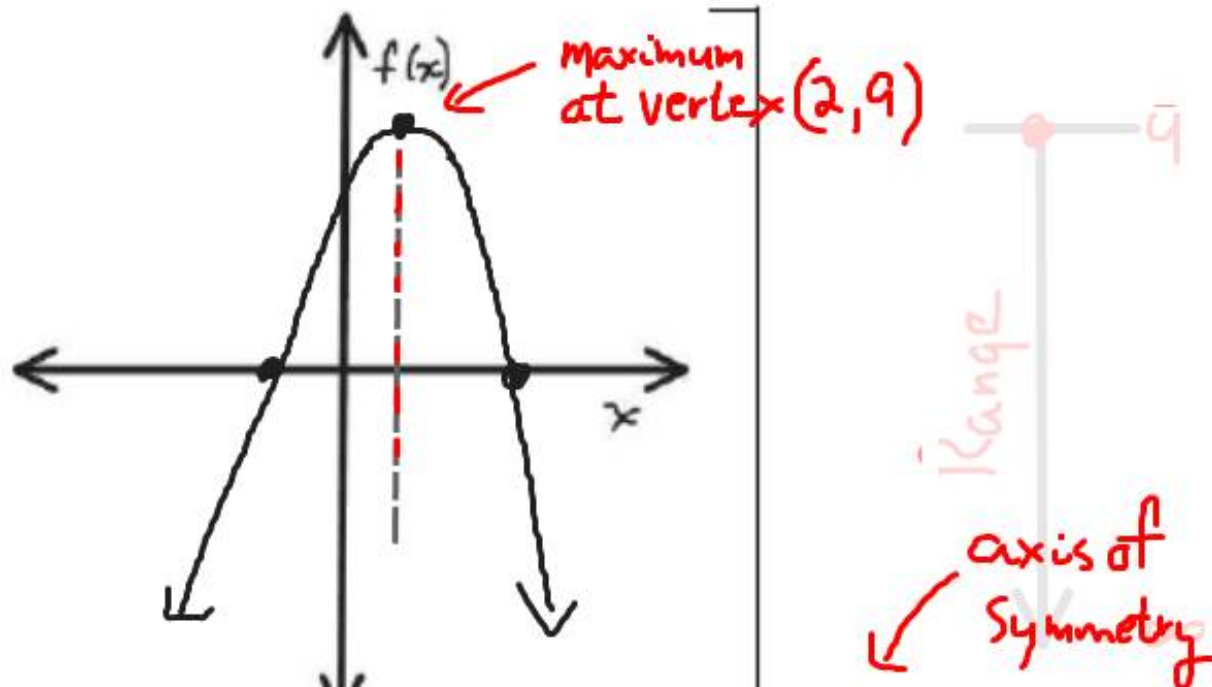
d. Indicate on the sketch and state:

→ y-intercept: $(0, 5)$
obviously

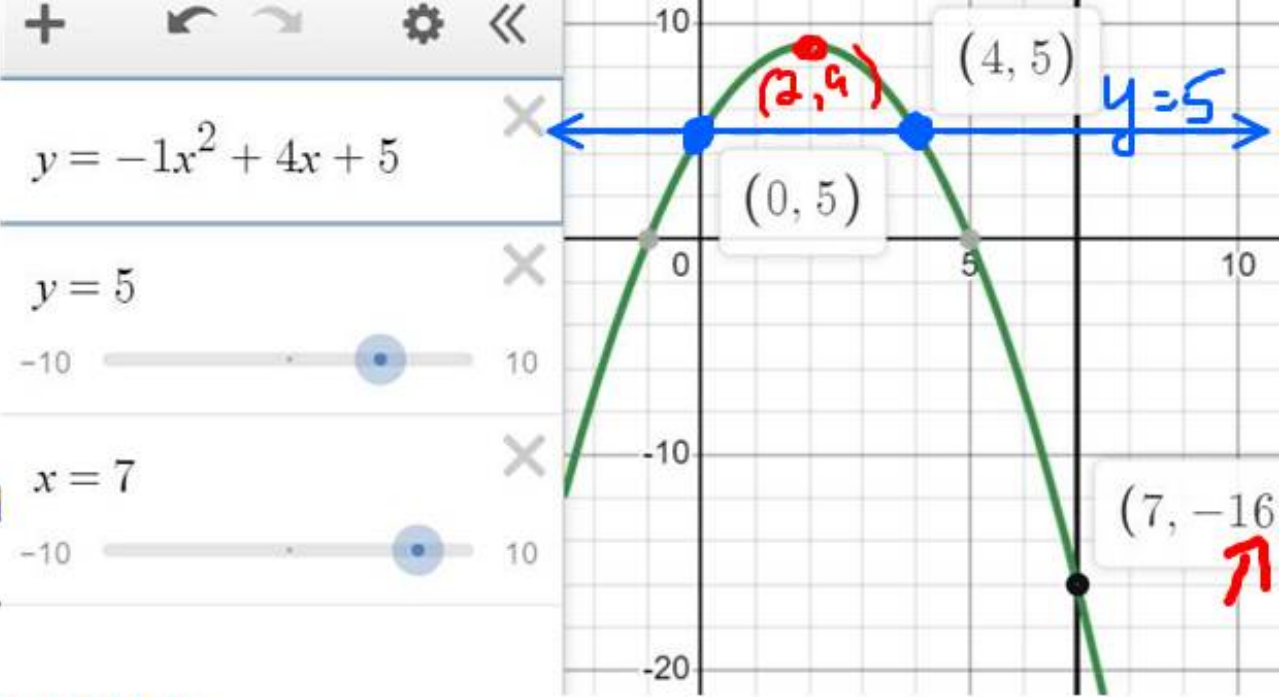
'zeros' [x-intercept(s)] if any

→ $(-1, 0); (5, 0)$

Two answers



max = 9



e. State the ~~minimum~~ or ~~max~~ value of the function: _____

f. Solve for x and state the answer below:

$$\rightarrow 5 = -1x^2 + 4x + 5$$

$$x = \{ \underline{0}, \underline{4} \}$$

What value(s) of x gives an "output" of 5?

Check $-1(0)^2 + 4(0) + 5 = 5$ ✓
 $-1(4)^2 + 4(4) + 5 = 5$ ✓
 $-16 + 16 + 5 = 5$ ✓

g. Evaluate the function for $x = 7$ and state the answer:

$$\rightarrow f(7) = \underline{-16}$$

$$-1(7^2) + 4(7) + 5 = -49 + 28 + 5 = -16$$
 an input of 7 gives an output of -16

That was it!