

***Grade 12 Applied***

***Week 7 Quiz Debrief***

***Functions and Finance***

***MrF***

1. For the following **quadratic** function:

$$f(x) = -1x^2 + 4x + 3$$

a. Use a graphing tool. Make a representative sketch of the function. Significant points should be in correct quadrants.

b. State the Domain and the Range

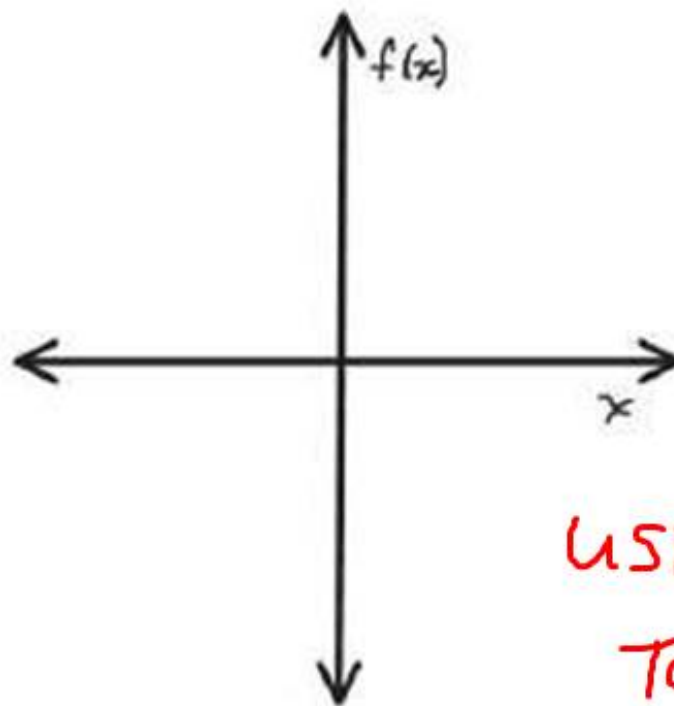
$$\{ \text{_____} < x < \text{_____} \}$$

$$\{ \text{_____} < f(x) < \text{_____} \}$$

c. Label on the sketch and state the following.

$$\text{Vertex: } ( \text{_____}, \text{_____} )$$

$$\text{Axis of Symmetry: } x = \text{_____}$$



USE A GRAPHING  
TOOL IN  
APPLIED  
MATH!

d. Label on the sketch and state:

$$y\text{-intercept: } ( \text{_____}, \text{_____} )$$

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

$$( \text{_____}, \text{_____} ) ; ( \text{_____}, \text{_____} )$$

f. Solve for x:

$$-8 = -1x^2 + 4x + 3$$

$$x = \text{_____} \quad \text{_____}$$

1. For the following quadratic function:

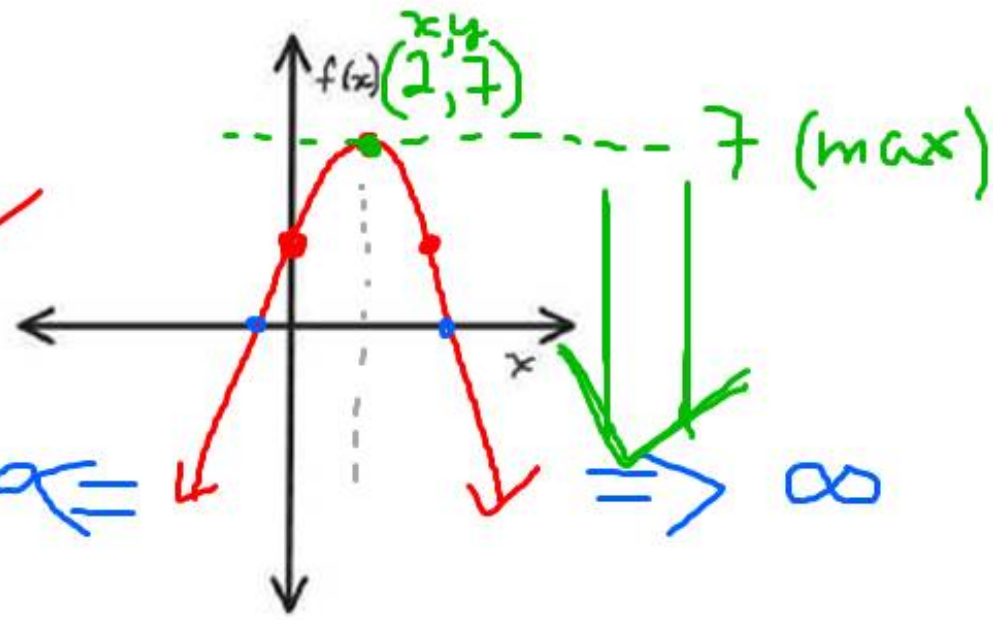
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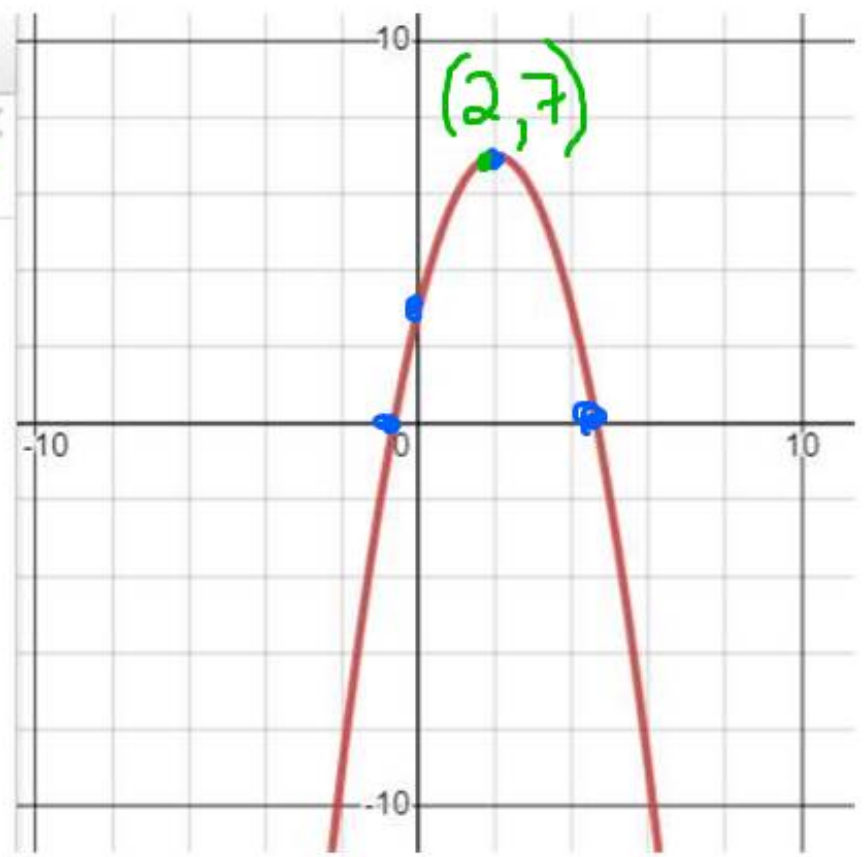
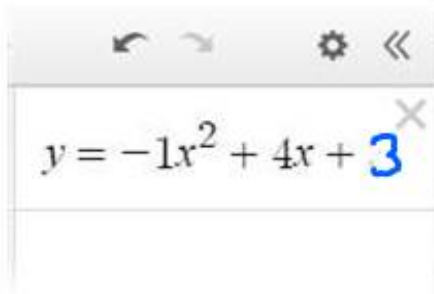
$$\{ -\infty < x < \infty \}$$

$$\{ -\infty < f(x) \leq 7 \}$$



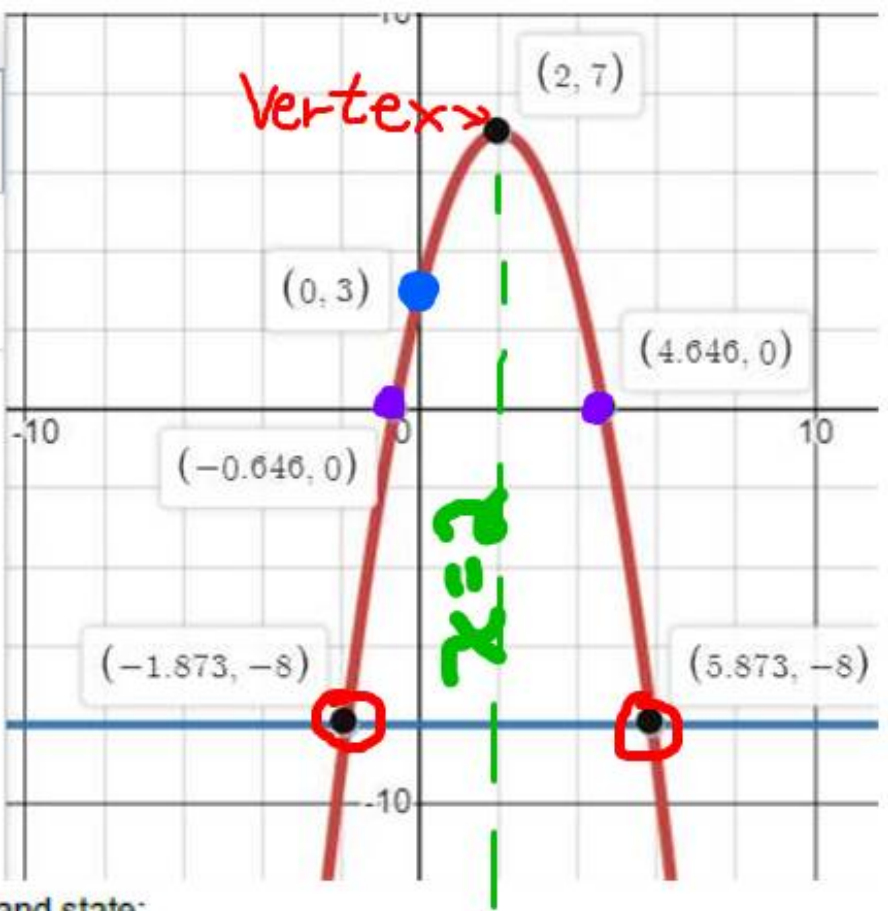
x is every possible number

y is all values less than, or equal to, 7.



$$y = -1x^2 + 4x + 3$$

$$y = -8$$



$$-(5.873)^2 + 4*(5.873) + 3 = -8.000129$$

c. Label on the sketch and state the following.

Vertex:  $(2, 7)$

→ Axis of Symmetry:  $x = 2$

d. Label on the sketch and state:

y - intercept:  $(0, 3)$

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

$(-0.65, 0); (4.65, 0)$

f. Solve for x:

$$-8 = -1x^2 + 4x + 3$$

$$x = -1.873 \text{ \& } 5.873$$

Check: Yes

$$-(-1.873)^2 + 4*(-1.873) + 3 = -8.000129 \checkmark$$

$$-(5.873)^2 + 4*(5.873) + 3 = -8.000129 \checkmark$$

If you were doing Pre-Calculus! Instead of Applied Math

$$f(x) = -1x^2 + 4x + 3$$

Find vertex  $(x, y)$

$$x = \frac{-b}{2a} = \frac{-4}{2(-1)} = 2$$

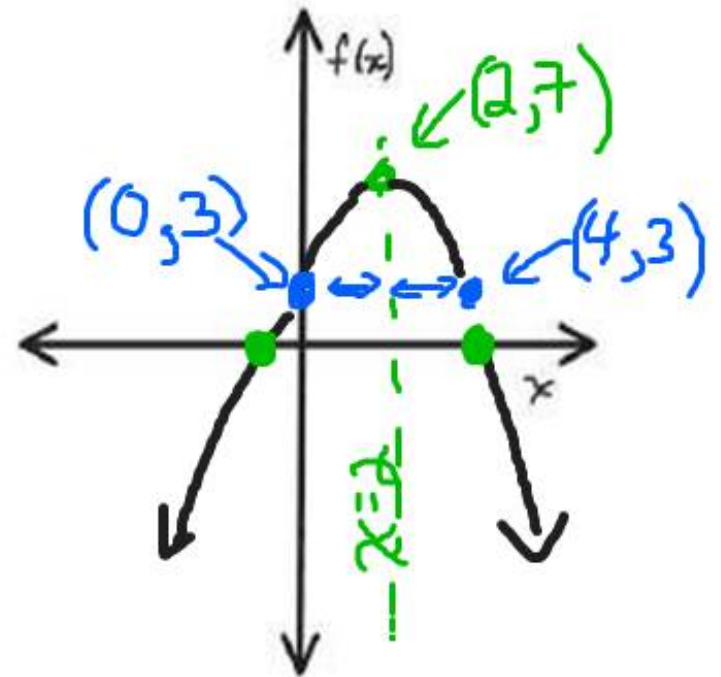
$$y = f(2) = -1(2)^2 + 4(2) + 3 \\ = -4 + 8 + 3 = 7$$

y-intcpt:  $y = -1(0)^2 + 4(0) + 3 \\ = 3$

x-intcpt

$$0 = -1x^2 + 4x + 3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-4 \pm \sqrt{4^2 - 4(-1)(3)}}{2(-1)} = \frac{-4 \pm \sqrt{16 + 12}}{-2} = \frac{-4 \pm \sqrt{28}}{-2}$$
$$= \frac{(-4 + \sqrt{28})}{-2} \quad \& \quad \frac{(-4 - \sqrt{28})}{-2}$$
$$= -0.6457! \quad \& \quad = 4.6457!$$



and if you were doing Pre-Calculus you would solve this by:

$$-8 = -1x^2 + 4x + 3$$

$$0 = -1x^2 + 4x + 11$$

$$0 = x^2 - 4x - 11$$

$$0 = (x^2 - 4x + 4) - 4 - 11$$

$$0 = (x-2)^2 - 15$$

$$15 = (x-2)^2$$

$$\pm\sqrt{15} = x-2$$

$$x = 2 \pm \sqrt{15}$$

$$= \frac{2 + \sqrt{15}}{1} = 5.8729$$

$$= \frac{2 - \sqrt{15}}{1} = -1.8729$$

**Maybe a  
graphing tool  
is easier???**

2 solutions

2. Danny deposits \$250 monthly into a retirement savings plan (RRSP) at the end of every month for 25 years. His bank offers an interest rate of 6.2% compounded monthly on that RRSP.

a) Determine how much his investment retirement fund will be worth when he is ready to retire after 25 years.

→ \$178,679.36

b) Danny does retire after the 25 years. He re-invests his retirement fund into an income fund that pays a guaranteed 4.5% and starts to withdraw \$1,500 per month to supplement his other income sources. Determine how many years his retirement fund will last.

→ ≈ 13 years

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

a)

Present Value	0
Payments	-250
Future Value	178,679.36
Annual Rate (%)	6.2
Periods	300
Compounding	Monthly

**Invest**

Present Value	-178,679.360
Payments	1,500 <i>monthly withdrawals</i>
Future Value	0
Annual Rate (%)	4.5
Periods	158.12 <i>≈ 13 years</i>
Compounding	Monthly

*1500/month Interest*

*\$179K*

*158 months*

3. Winston buys a dining table and six chairs for \$645. Katelyn buys the same dining table and only four chairs for \$505. Determine the cost of the dining table.

**Logic:**

WINSTON got two extra chairs for an extra \$140. So each chair is \$70. So  $6 \cdot 70$  is 420 so the table is \$225

Lots of way to solve

- Logic
- Guess & Check
- Graph
- Algebra

**Guess & Check**

Price one chair	Cost six chairs	Table	Winston Total	Katelyn 4 chairs	Table	Katelyn Total
<del>× \$50?</del>	300	+ 345	<del>645</del>	200	305	<del>505</del>
<del>× 60?</del>	360	+ 285	645	240	265	505
<u>70?</u>	420	+ 225	645	280	225	505

A chair is \$70 and a table is \$225

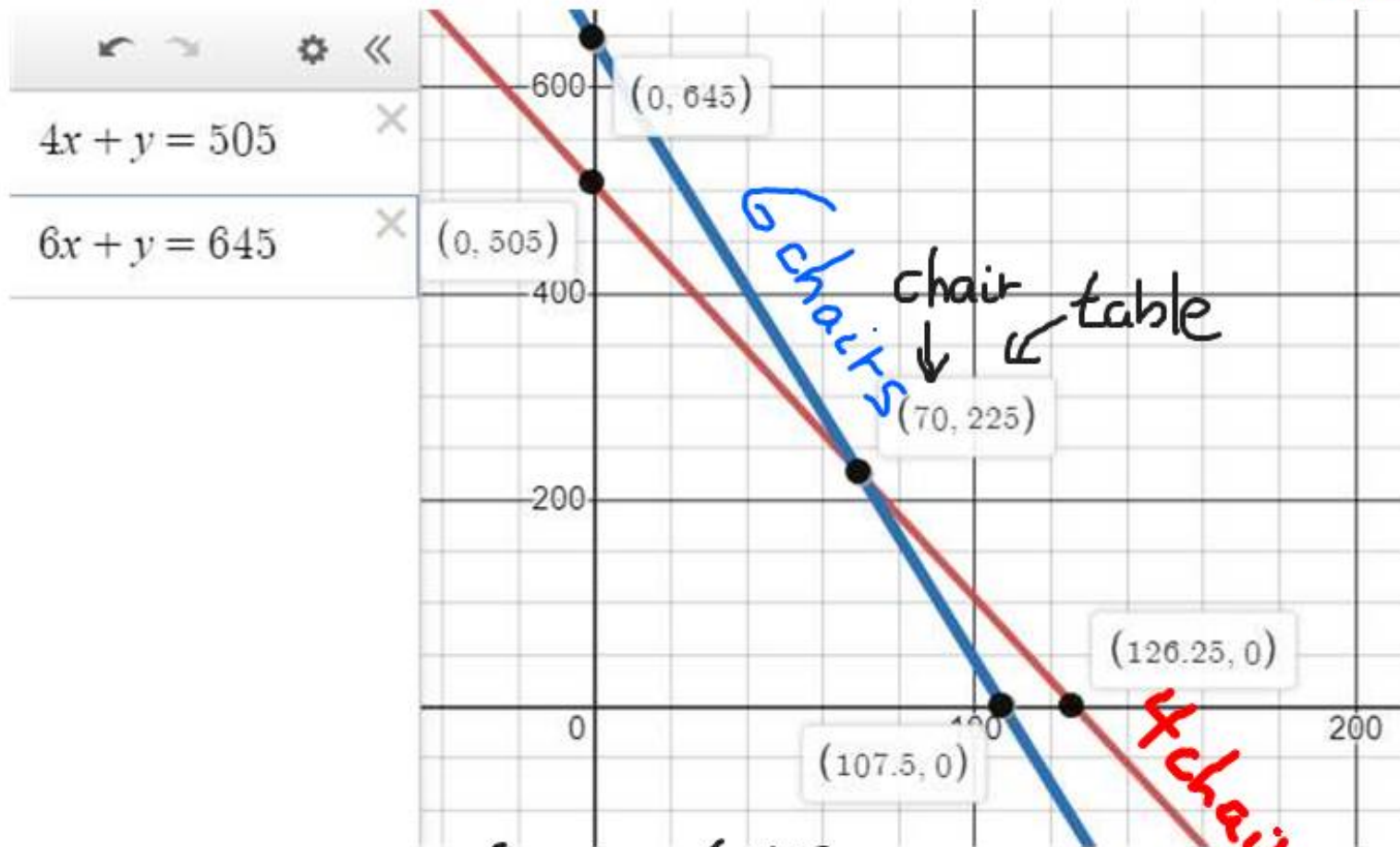
Checks:  $6 \cdot 70 + 225 = 645$

$4 \cdot 70 + 225 = 505$



3. Winston buys a dining table and six chairs for \$645. Katelyn buys the same dining table and only four chairs for \$505. Determine the cost of the dining table.

*Lots of way to solve*



*→ Graph  
→ Algebra*

**Check out the Movie that explains this!**

Algebra:

$$\begin{array}{r} 6x + y = 645 \\ - (4x + y = 505) \\ \hline 2x = 140 \\ x = 70 \\ \hat{\text{chair}} \end{array}$$

$$\begin{array}{r} 4x + y = 505 \\ 4(70) + y = 505 \\ 280 + y = 505 \\ \boxed{y = 225} \end{array}$$

BONUS (1 MARK)

Determine how many ways all the letters in the word SHREDDIES can be distinguishably arranged if the first letter has to be a D.

Handwritten solution for the bonus question:

Diagram illustrating the arrangement of the word SHREDDIES with the first letter fixed as D:

S H R  
E D D  
I E S

Calculation steps:

$\frac{1}{2}$  (MUST BE 'D')

$\left( \frac{8!}{2! \cdot 2!} \right)$  (ALL THE REST)

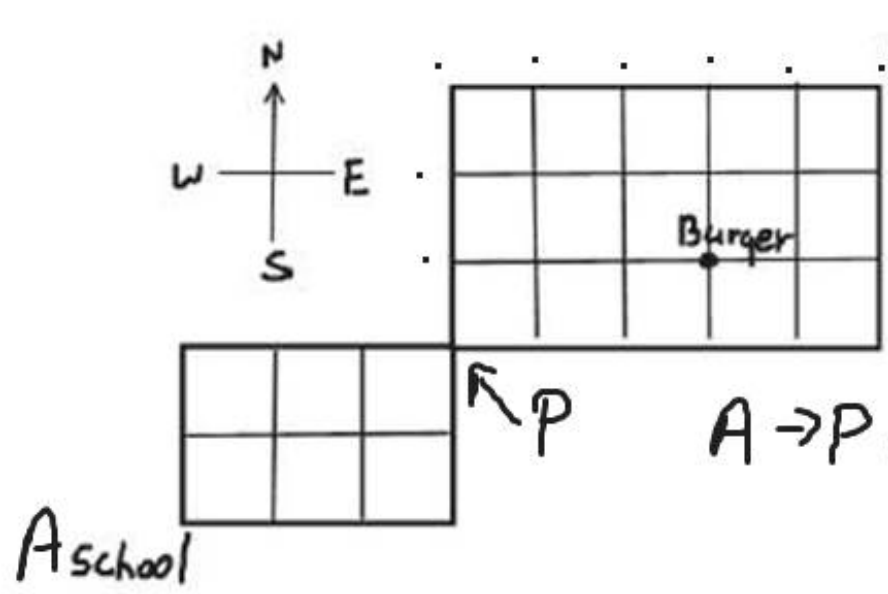
$\frac{\frac{1}{2} \cdot \left( \frac{8!}{2! \cdot 2!} \right)}{2!}$

Result: 10,080

$n = 9$  letters



Josh is heading home from school. He randomly selects his route home. He is only allowed to make moves North or East. Determine the probability he wanders past the new burger place that someone had mentioned.



Sometime the grid will get too big and you will want to solve with a numerical method

MOVES

$$A \rightarrow P: \frac{5!}{(2! \cdot 3!)} = 10 \text{ paths}$$

$\uparrow$  North     $\uparrow$  East

$$P \rightarrow B = \frac{8!}{3! \cdot 5!} = 56 \text{ paths}$$

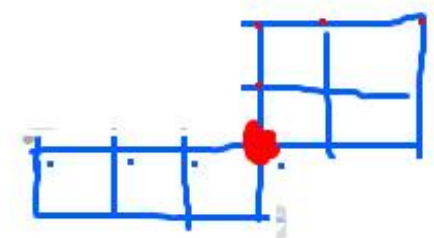
$\nearrow$  N     $\uparrow$  E

FCP:  $10 \cdot 56 = 560$  paths A  $\rightarrow$  B

Now; A  $\rightarrow$  B thru Burger  
 $A \rightarrow P = 10$  paths

P  $\rightarrow$  B Thru Burger

P  $\rightarrow$  Burger



$$\frac{4!}{1! \cdot 3!} = 4 ; \frac{4!}{2! \cdot 2!} = 6$$

F.C.P.  $10 \cdot 4 \cdot 6 = 240$  paths from School to Home passing Burger place

**Burger!**



***CERTI  
PROVEHENDI***