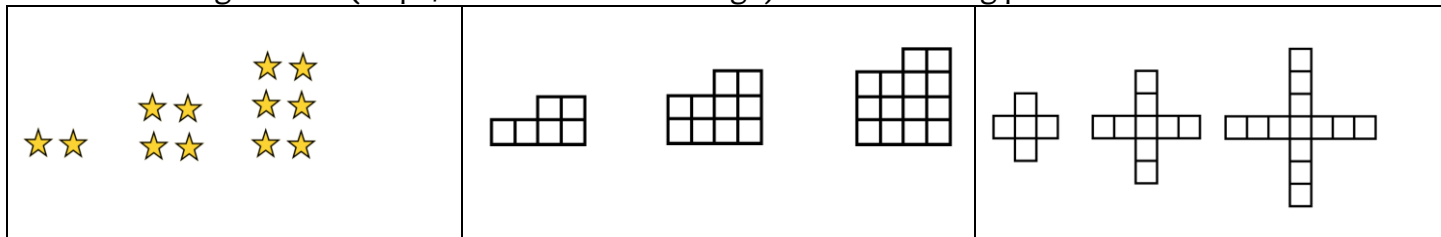


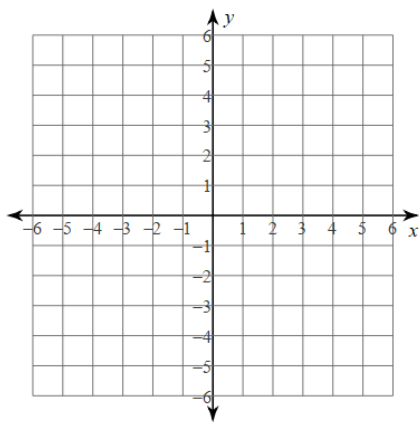
UNIT 1: LINEAR EQUATIONS

1. What are the gradients (slope/constant rate of change) of the following patterns?

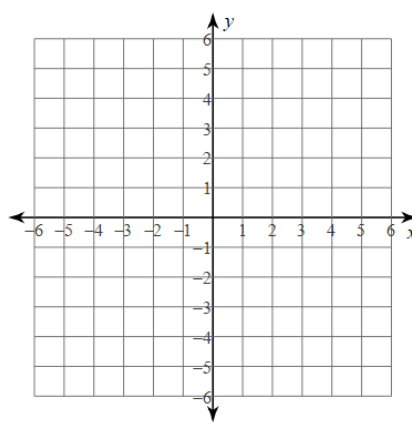


2. Graph the linear equations. Identify the rate of change (gradient/slope) & starting value (y-int).

(a) $y = -\frac{1}{3}x + 4$

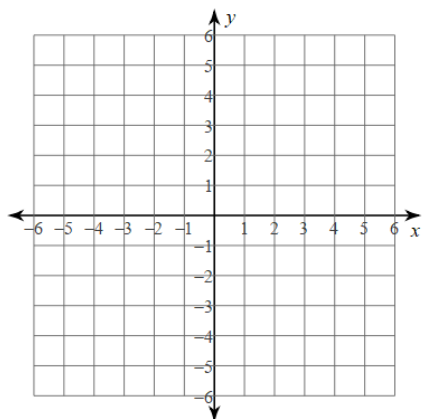


(b) $y = \frac{4}{3}x + 1$

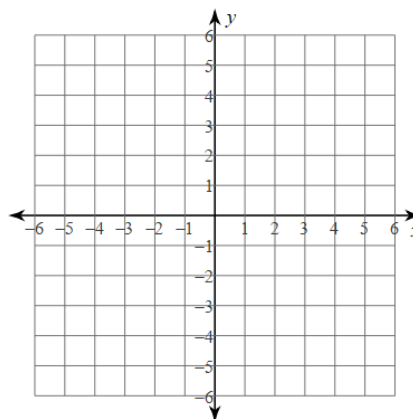


3. Graph the system of equations.

(a) $y = -\frac{2}{3}x + 4$
 $y = \frac{1}{3}x + 1$



(b) $y = x + 1$
 $y = -3$



4. What is a solution to a system of linear equations?

5. Solve the system of linear equations algebraically.

(a) Solve using substitution.

$$y = -6x + 14$$

$$y = 2x + 6$$

(b) Solve using substitution.

$$y = -7x - 6$$

$$y = -6x - 5$$

(c) Solve using substitution.

$$4x + 8y = -24$$

$$y = -6$$

(d) Solve using substitution.

$$-6x + 7y = 16$$

$$y = -5x + 14$$

(e) Solve using elimination.

$$-3x + 3y = -9$$

$$3x - 6y = 0$$

(f) Solve using elimination.

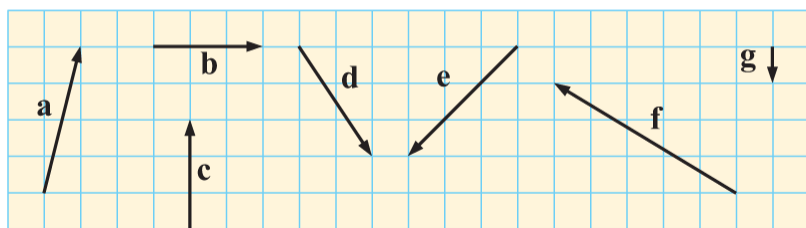
$$-7x + 9y = -23$$

$$14x + 7y = 21$$

UNIT 2: VECTORS

6. Write the component form of the vector.

Write each vector in the form $\begin{pmatrix} x \\ y \end{pmatrix}$:



7. Find the approximated length of the vector

a $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

b $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$

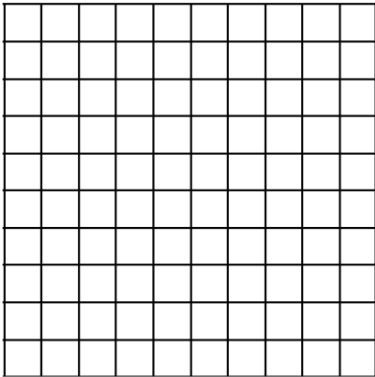
c $\begin{pmatrix} -4 \\ -2 \end{pmatrix}$

d $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$

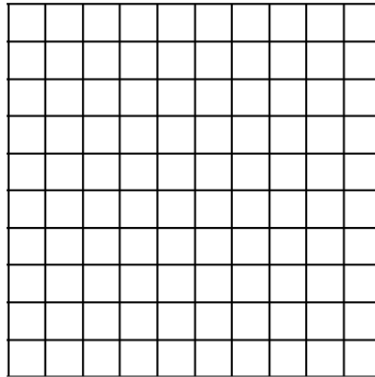
8. Do the vector addition.

If $\mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$, and $\mathbf{c} = \begin{pmatrix} -4 \\ 1 \end{pmatrix}$, find:

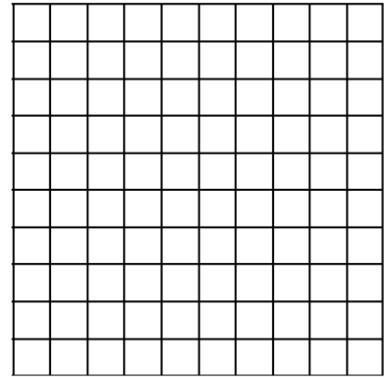
a $\mathbf{a} + \mathbf{b}$



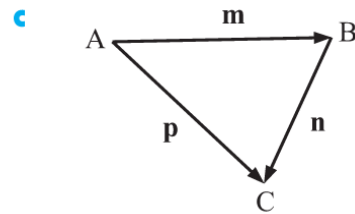
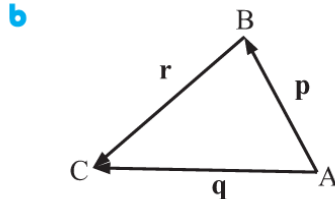
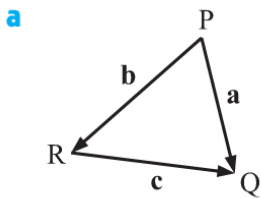
b $\mathbf{b} + \mathbf{a}$



c $\mathbf{b} + \mathbf{c}$



9. Write a vector equation to connect the vectors in the following:



10. Simplify.

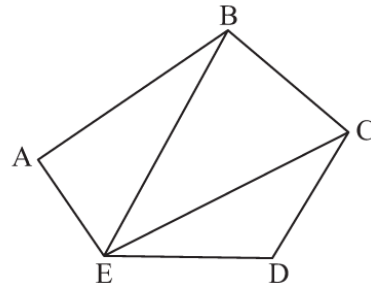
Simplify:

a $\vec{AB} + \vec{BE}$

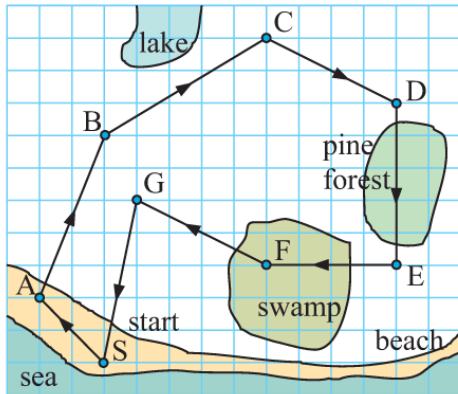
b $\vec{BC} + \vec{CE}$

c $\vec{BC} + \vec{CD} + \vec{DE}$

d $\vec{AB} + \vec{BC} + \vec{CD} + \vec{DE}$



11. Solve the vector application.

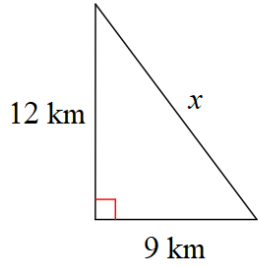


The diagram alongside shows an orienteering course run by Kahu.

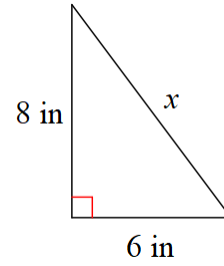
- a** Write a column vector to describe each leg of the course.
- b** Find the sum of all of the vectors.
- c** What does the sum in **b** tell us?

12. Solve for unknown side lengths in the right triangles.

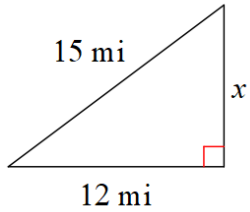
(a) Solve for the hypotenuse.



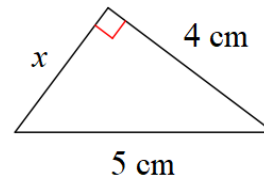
(b) Solve for the hypotenuse.



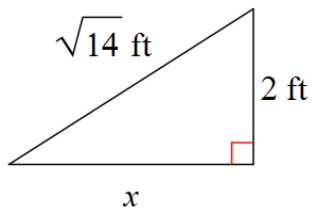
(c) Solve for the leg length.



(d) Solve for the leg length.



(e) Solve for the leg length.

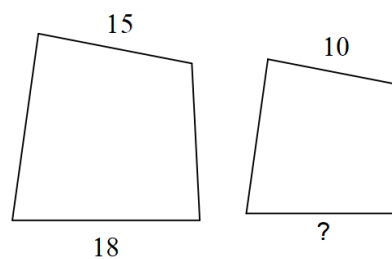
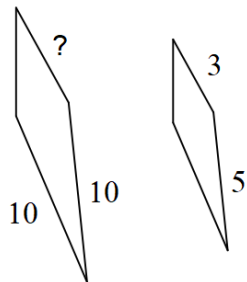


UNIT 3: SIMILARITY AND TRIGONOMETRY

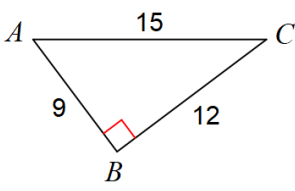
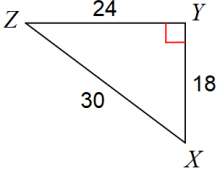
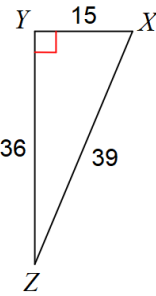
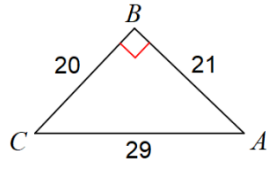
13. Solve the proportions.

$\frac{2}{10} = \frac{9}{n}$	$\frac{8}{10} = \frac{10}{a}$	$\frac{9}{3} = \frac{p-2}{9}$	$\frac{5}{4} = \frac{k-8}{7}$
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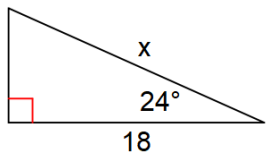
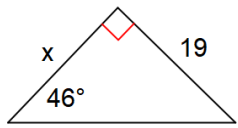
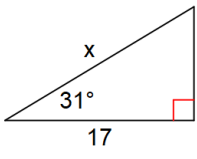
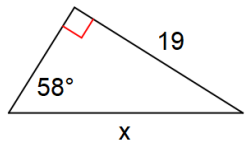
14. The polygons are similar. Solve for the unknown side length.



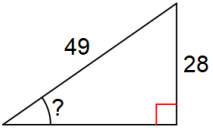
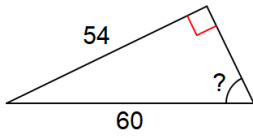
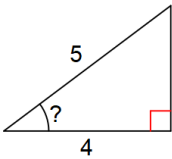
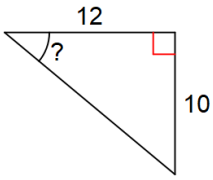
15. Find the exact trigonometric ratios.

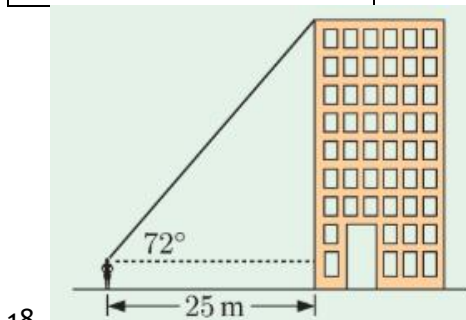
<p>$\cos A$</p> 	<p>$\sin Z$</p> 	<p>$\tan X$</p> 	<p>$\sin A$</p> <p>$\cos A$</p> <p>$\tan A$</p> 
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16. Solve for the unknown side length.

			
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17. Solve for the unknown angle measure.

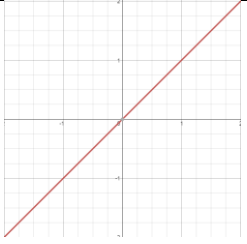
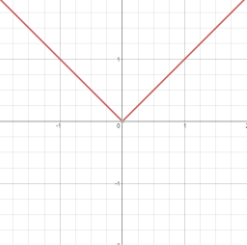
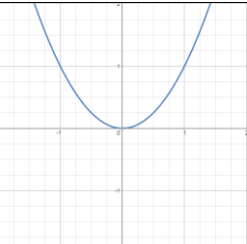
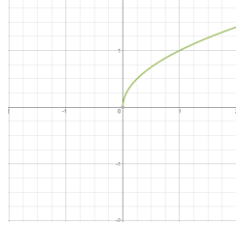
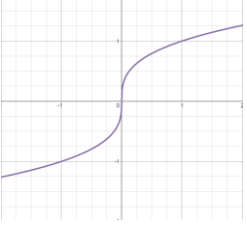
			
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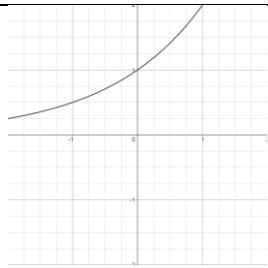
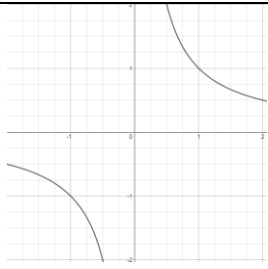
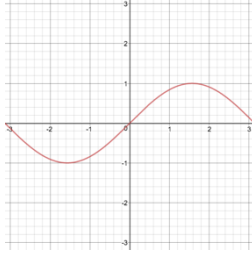


A young girl's eyes are one metre above ground level. She stands 25 m from the base of a tall building. She looks up to the top of the building at an angle of 72° . Find the height of the building.

UNIT 4: FUNCTION TRANSFORMATIONS

19. Complete this table by filling in the missing boxes

Function	Equation	Domain/ Range	Graph
Linear Function	$f(x) = x$		
Absolute Value Function		D: $(-\infty, \infty)$ or \mathbb{R} R: $[0, \infty)$	
	$f(x) = x^2$	D: $(-\infty, \infty)$ or \mathbb{R} R: $[0, \infty)$	
Cubic Function	$f(x) = x^3$	D: $(-\infty, \infty)$ or \mathbb{R} R: $(-\infty, \infty)$ or \mathbb{R}	
Square Root Function	$f(x) = \sqrt{x}$		
Cube Root Function		D: $(-\infty, \infty)$ or \mathbb{R} R: $(-\infty, \infty)$ or \mathbb{R}	

	$f(x) = 2^x$	D: $(-\infty, \infty)$ or \mathbb{R} R: $(0, \infty)$	
Rational Function		D: $\mathbb{R} \mid x \neq 0$ R: $\mathbb{R} \mid y \neq 0$	
Sine Function	$f(x) = \sin(x)$		

20. **Mini Investigation** of the quadratic function: $f(x) = x^2$. Describe the transformations that occur using your graphing calculator or **desmos.com**.

a. $g(x) = x^2 + 4$

$g(x) = x^2 - 5$

b. $g(x) = (x - 2)^2$

$g(x) = (x + 6)^2$

a. $g(x) = -x^2$

a. $g(x) = \frac{1}{2}x^2$

$g(x) = 4x^2$

21. Identify the parent function and describe the transformation.

a. $g(x) = -x^2$

b. $g(x) = -\frac{1}{2}x^3$

c. $g(x) = 5\sqrt{-x} + 2$

d. $g(x) = \frac{1}{3}|x| - 1$

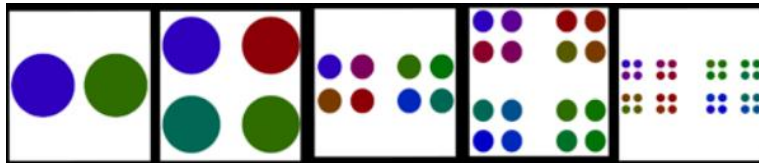
e. $g(x) = -2 \cdot 2^{x-2} + 1$

22. Write an equation to the right for each function described below.

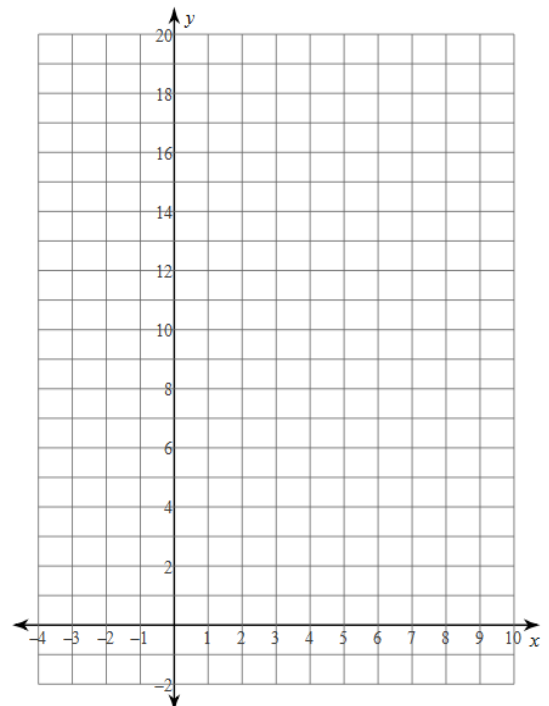
- The graph of the absolute value function translated 4 units to the left, vertically stretched by 4, and reflected over the x axis
- The graph of the quadratic Function translated 2 units to the right, vertically compressed by $\frac{1}{2}$
- The graph of the rational function translated 5 units up, 3 units left, and a reflection over the x axis
- The graph of the cubic function translated 6 units down, 3 units to the right, reflected over the x axis, and vertically stretched by 4
- The graph of the square root function vertically stretched by a factor of 3, reflected over the y axis, and up 7

UNIT 5: EXPONENTIAL FUNCTIONS

23. Dot Pattern:



x (Stage)	y (Number of Dots)
-3	
-2	
-1	
0	
1	
2	
3	
4	
5	



24. Simplify. Your answers should have only **positive** exponents.

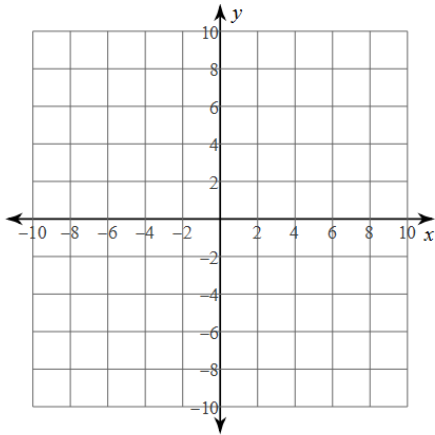
a) $a^3 \cdot a^5$	b) $\frac{2^9}{2^3}$
c) m^0	d) $-5x^0$
e) $x^3 \cdot x^{-7}$	f) $\frac{4^3}{4^8}$
f) $(w^3)^5$	g) $(3x^5)^2$

h) $\frac{2a^0 \cdot b}{ab^5 \cdot a^2b}$
i) $\frac{(3x^5)^2 \cdot x^{-8} \cdot y^{-5} \cdot y}{x^3 \cdot y^2}$

UNIT 6: QUADRATIC FUNCTIONS

25. Graph a quadratic given an equation and the use of a table.

$$y = x^2 - 6x + 5$$



x						
y						

26. Expand (translate from factored to general form).

a) $x(x - 3)$

b) $(x - 2)(x + 7)$

c) $(x + 3)(x + 8)$

d) $(x + 5)(x - 9)$

e) $(x + 2)^2$

27. Factor (translate from general to factored form).

a) $x^2 + 12x + 27$

b) $x^2 - 8x + 7$

c) $x^2 - 9x + 18$

d) $x^2 - 2x - 63$

e) $x^2 + 13x + 36$

28. Solve the quadratic equations (by taking square roots, Null Factor Law, and factoring).

a) $x^2 + 4 = 20$

b) $(x - 2)^2 + 3 = 67$

c) $x^2 = 49$

d) $x^2 - 5 = 11$

e) $(x - 4)(x - 5) = 0$

f) $(x - 8)(x + 3) = 0$

g) $x^2 - 16x + 60 = 0$

h) $x^2 - 9x + 14 = 0$

UNIT 7: STATISTICS

29. Find the mean, median and mode of numbers of hours slept.

Hours Slept

7.25 6.5 5.75 6 8
8.5 9 7.75 6.5 6.25
5.75

30. Find the Minimum, 1st Quartile, Median, 3rd Quartile, and Maximum Life Expectancies.

Life Expectancy

State	Years	State	Years	State	Years	State	Years
South Dakota	74.3	New Hampshire	80.1	Minnesota	80.3	Wisconsin	79.8
Colorado	80.9	Indiana	81.3	South Carolina	78.3	Kansas	78.6
District of Columbia	77.9	Nebraska	79.8	Connecticut	82.7	Pennsylvania	81.6
Arizona	79.3	Massachusetts	83.8	Louisiana	78.2	Iowa	79.8

31. Create a Box Plot.

32. Analyze the Box Plot in the previous problem.

- i. "50% of the states have a life expectancy between _____ and _____ years."
- ii. "25% of the states have a life expectancy above _____ years."
- iii. "75% of the states have a life expectancy above _____ years."

UNIT 8: PROBABILITY

33. List all possible outcomes.

<p>You are setting the combination on a three-digit lock. You want to use the numbers 381 but don't care what order they are in.</p>	<p>A coffee shop offers small, medium, and large sizes. Customers can choose between French roast, Italian roast, and American roast.</p>
<p>A basketball player attempts two free throws. Each attempt results in a score or a miss.</p>	<p>When a button is pressed, a computer program outputs a random odd number greater than 1 and less than 9. You press the button twice.</p>

