

12. For a science experiment, a projectile is launched. Its path is given by  $h(d) = -5d^2 + 24d + 30$ , where  $h$  is the height of the projectile above the ground and  $d$  is the horizontal distance of the projectile from the launch pad, both in metres. How far away from the launch pad was the projectile when it landed, to the nearest tenth of a metre? 5.8 m

13. A parachutist jumps from an airplane and immediately opens his parachute. His altitude,  $y$ , in metres, after  $t$  seconds is modelled by the equation  $y = -4t + 300$ . A second parachutist jumps 5 s later and free-falls for a few seconds. Her altitude, in metres, during this time, is modelled by the equation  $y = -4.9(t - 5)^2 + 300$ . When does she reach the same altitude as the first parachutist (to the nearest tenth)? After 7.5 s (@ 270m)

14. Solve the system algebraically.

$y = 4x^2 + 13$

$y + 7 = 4x^2$

$4x^2 + 13 + 7 = 4x^2$   
 $4x^2 + 20 = 4x^2$   
 $20 = 0$

No solution

15. A sheet-metal worker must cut a rectangular sheet with a diagonal of 15 cm long and a perimeter of 42 cm. What length and width should be used? length: 12 cm, width: 9 cm

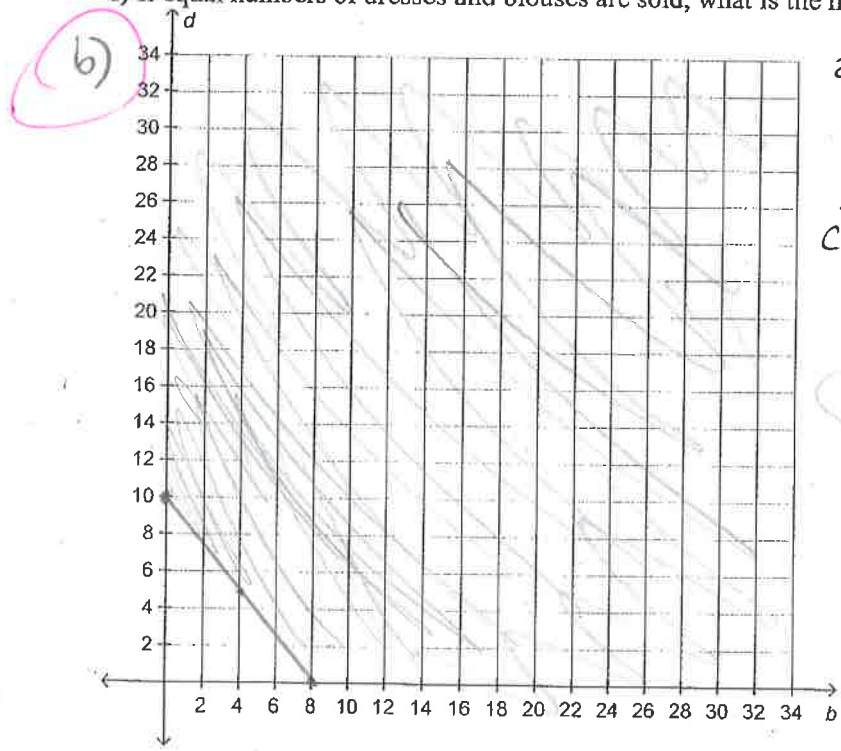
16. A women's clothing store makes an average profit of \$125 on each dress sold and \$50 on each blouse. The manager's target is to make at least \$500 a day on sales from dresses and blouses.

a) What inequality represents the numbers of dresses and blouses that can be sold each day to reach the target?

b) Graph the inequality.

c) If equal numbers of dresses and blouses are sold, what is the minimum number needed to reach the target?

not sure →



a)  $500 \leq 125x + 50y$   
 $100 \leq 25x + 10y$   
 $20 \leq 5x + 2y$

c)  $20 = 5x + 2x$   
 $20 = 7x$   
 $2.9 = x$

Min @  $x=3, y=3$   
minimum 3 dresses and 3 blouses

$20 - 5x \leq 2y$   
 $10 - \frac{5}{2}x \leq y$

11. Let  $l$  = length,  $w$  = width

$$P = 2l + 2w \quad A = lw$$

$$202 = 2l + 2w \quad 2170 = lw$$

$$\frac{2170}{w} = l$$

$$202 = 2\left(\frac{2170}{w}\right) + 2w$$

$$(202 = \frac{4340}{w} + 2w)w$$

$$202w = 4340 + 2w^2$$

$$0 = 2w^2 - 202w + 4340$$

$$0 = w^2 - 101w + 2170$$

$$w = 70, 31$$

$$\begin{array}{r} 2170 \\ 2 \overline{) 685} \\ 5 \overline{) 434} \\ 7 \overline{) 310} \\ 10 \overline{) 217} \end{array}$$

$$\begin{array}{r} \pm 39 \\ 101 \overline{) 51621} \\ \underline{\phantom{0} 2} \end{array}$$

$$2170 = l(70) \quad \text{At } 31 \text{ by } 70 \text{m}$$

$$31 = l$$

$$\left(\frac{40}{2}\right)^2 = 400 - 0.025 = -10$$

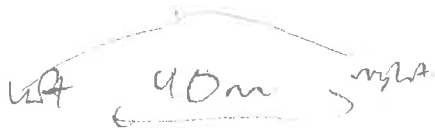
$$8. \quad h = -0.025(d^2 - 40d) + 400$$

-10

$$h - 400 = -0.025(d - 20)^2$$

$$h = -0.025(d - 20)^2 + 400$$

$$20 \cdot 2 = 40 \text{m}$$



$$22. a) s = 2\pi \sqrt{\frac{l}{32}} \quad b) 1.8 \quad l = 32 \left(\frac{1.5}{2\pi}\right)^2$$

$$l = 1.8 \text{ ft}$$

$$\frac{s}{2\pi} = \sqrt{\frac{l}{32}}$$

$$\left(\frac{s}{2\pi}\right)^2 = \frac{l}{32}$$

$$32 \left(\frac{s}{2\pi}\right)^2 = l$$

$$30. \frac{x(x-2)}{x+1} \cdot \frac{(x+1)(x-1)}{(x-2)(x+3)} = \frac{x(x-1)}{x+3}$$

$$31. \frac{4x-1}{(x+3)(x+4)} \cdot \frac{(x-3)(x+4)}{2x-1} = \frac{4x-1}{(x+3)2x-1}$$

$$x \neq -3, -4, 3, \frac{1}{2}$$

$$32. \frac{x}{(x+1)(x-4)} - \frac{4}{x+1} = \frac{x}{(x+1)(x+4)} - \frac{4x-16}{(x+1)(x-4)} = \frac{-3x+16}{(x+1)(x-4)}$$

$$4(x-4)$$

$$4x-16$$

$$\text{LCD } (x-1)(x+1)(x+3)$$

$$33. \frac{5}{(x+1)(x-1)} - \frac{2}{(x+1)(x+3)} + \frac{3}{(x-1)(x+3)}$$

$$= \frac{5(x+3)}{\text{LCD}} - \frac{2(x-1)}{\text{LCD}} + \frac{3(x+1)}{\text{LCD}} = \frac{5x+15}{\text{LCD}} - \frac{2x+2}{\text{LCD}} + \frac{3x+3}{\text{LCD}} = \frac{6x+20}{\text{LCD}} = \frac{2(3x+10)}{(x+3)(x-1)(x+1)}$$

$$34. \frac{5}{x-1} + \frac{2}{x+1} = -6 \Rightarrow \frac{5(x+1)}{(x-1)(x+1)} + \frac{2(x-1)}{(x-1)(x+1)} = \frac{-6(x^2-1)}{(x-1)(x+1)} \Rightarrow 5x+5+2x-2 = -6x^2+6$$

$$\Rightarrow 7x+3 = -6x^2+6$$

$$\Rightarrow 6x^2+7x-3=0$$

$$(6x^2-2x)(3x-1) = 0$$

$$2x(3x-1) \cdot 3(3x-1) = 0$$

$$(3x-1)(2x+3) = 0$$

$$x = \frac{1}{3}, -\frac{3}{2}$$

$$\frac{-18}{1 \pm 18} = -2 \pm 9$$

$$38. \left| \frac{1}{2}x+1 \right| = x+1$$

$$+) \left( \frac{1}{2}x+1 = x+1 \right)^2$$

$$x+2 = 2x+2$$

$$0 = x$$

$$-) \left( -\frac{1}{2}x-1 = x+1 \right)^2$$

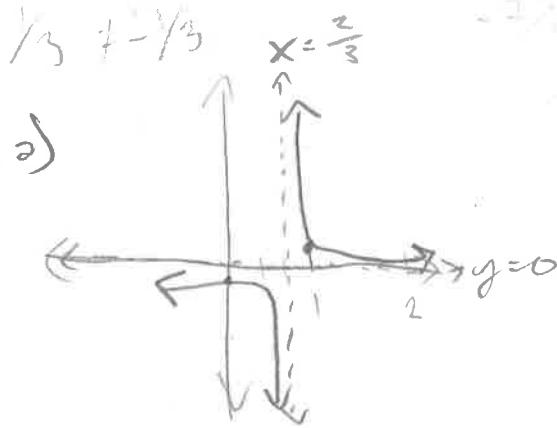
$$x+2 = -2x-2$$

$$\frac{3x}{3} = \frac{-4}{3}$$

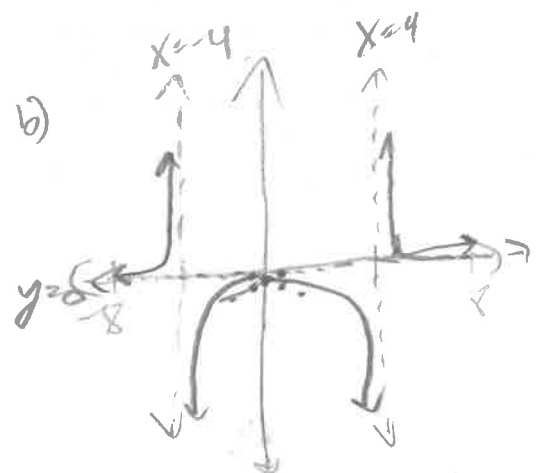
$$x = -\frac{4}{3}$$

x	y
0	-0.0625
1	-0.066

39. a)



b)



17. Etienne owns a small recycling company that picks up empty glass bottles from restaurants. At the first restaurant, he picks up 50 bottles. At each restaurant after this, he picks up 4 more bottles than he picked up at the restaurant before. Assume that this pattern continues.
- Write the first four terms of the arithmetic sequence that represents the number of bottles he picks up at a restaurant.
  - Determine  $a$  and  $d$  for the sequence.
  - How many bottles will he have picked up after stopping at the eighth restaurant?
  - If his truck can hold 2000 empty bottles, will he be able to pick up bottles at the 21st restaurant without emptying the truck first?

18. A company purchases a new computer system valued at \$42 000. For income tax purposes, an accountant determines that the annual depreciation rate (rate of decrease in value) for the equipment is 11%.
- Make a table of values to show the value of the system over the first 5 years.
  - Determine an explicit formula in function notation to model the value of the system in year  $n$ .
  - What is the value of the system at the end of year 20?
  - How realistic is the answer to part c)? Explain.

19. Write each repeating decimal number as an equivalent fraction in lowest terms.

a)  $0.5555\dots = \frac{5}{9}$

b)  $0.12\overline{12} = \frac{11}{90}$

20. The measures of the legs of a right triangle can be represented by the expressions  $4x^2y^2$  and  $8x^2y^2$ . What is a simplified expression for the measure of the hypotenuse?

$c = 4x^2y^2\sqrt{5}$

21. Is the equation  $\sqrt{ab} = (\sqrt{a})(\sqrt{b})$  true for negative values of  $a$  and  $b$ ? Explain your reasoning.

No, because of PEMDAS.

Would need to solve what's inside brackets first, resulting in an undefined solution on the right side of the equation  $\Rightarrow$  both sides aren't equal.

22. The formula  $s = 2\pi\sqrt{\frac{l}{32}}$  represents the swing of a pendulum, where  $s$  is the time, in seconds, to swing back and forth, and  $l$  is the length of the pendulum, in feet.

a) Solve the formula for  $l$ .  $l = 32\left(\frac{s}{2\pi}\right)^2$

b) What is the length of a pendulum that makes one swing in 1.5 s?  $1.8 \text{ ft}$

23. In a triathlon, a contestant swims 5 km, cycles 30 km, and then runs 20 km. In general, a contestant runs at an average speed of  $x$ , swims at an average speed of  $\frac{x}{5}$ , and cycles at an average speed of  $5x$ , where  $x$  is in kilometres per hour.

a) Determine an expression for the total time taken to complete the race.

b) Cynthia can swim at 2 km/h. How long will it take her to complete the race?

c) If Shaitha can cycle at 40 km/h, how much longer will it take her to complete the race, compared to Cynthia?

a)  $\frac{5}{\frac{x}{5}} + \frac{30}{5x} + \frac{20}{x} = \frac{25}{x} + \frac{6}{x} + \frac{20}{x} = \frac{51}{x}$

b)  $2 = \frac{x}{5}$   
 $x = 10$   
 $\frac{51}{x} = \frac{51}{10} = 5.1 \text{ hours}$

c)  $40 = 5x$   
 $x = 8$   
 $\frac{51}{x} = \frac{51}{8} = 6.4 \text{ hours}$

$6.4 - 5.1 = 1.3 \text{ hours longer}$  *Answer*

Name: \_\_\_\_\_

$$(x+2)(x-3)$$

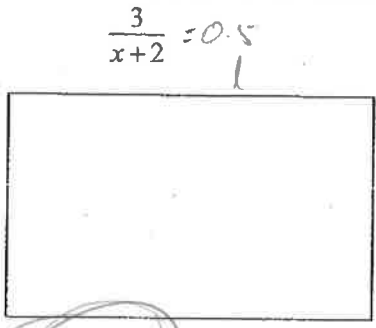
$$x^2 - 3x + 2x - 6$$

$$x^2 - x - 6$$

ID: A

$$\frac{-4}{1-4}$$

24. The rectangle has a perimeter of 5 units. What is the value of x?  $P = 2l + 2w$



$$\frac{3}{x+2} = 0.5$$

$$5 = 2\left(\frac{3}{x+2}\right) + 2\left(\frac{2}{x-3}\right)$$

$$5 = \frac{6}{x+2} + \frac{4}{x-3}$$

$$\frac{2}{x-3} 5(x^2 - x - 6) = 6(x-3) + 4(x+2)$$

$$5x^2 - 5x - 30 = 6x - 18 + 4x + 8$$

$$5x^2 - 15x - 20 = 0$$

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

$$(x+1)(x-4) = 0$$

$$x = -1, 4$$

$$x = 4$$

25. Jerry jogged 9 km in an hour. He covered the last 4 km at a speed that was 2 km/h slower than his speed over the first 5 km. What was his speed over the first 5 km?

$$10 \text{ km/h}$$

26. A car and a bus left Regina at the same time. The car drove 480 km west to Calgary. The bus drove 570 km east to Winnipeg. The bus travelled 15 km/h faster than the car. The car and the bus arrived at their destinations at the same time. What were the speeds of the car and the bus?

$$Car = 80 \text{ km/h}, Bus = 95 \text{ km/h}$$

$$\frac{10}{1-10}$$

$$25. \quad 1 = \frac{5}{x} + \frac{4}{x-2}$$

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

$$x^2 - 2x = 5x - 10 + 4x$$

$$x^2 - 11x + 10 = 0$$

$$(x-1)(x-10) = 0$$

$$x = 1, x = 10$$

too slow!

$$\frac{5}{9} + \frac{4}{9} = \frac{9}{9}$$

$$26. \quad \frac{480}{x} = \frac{570}{x+15} \quad \text{Let } x = \text{car}, x+15 = \text{bus}$$

$$480(x+15) = 570(x)$$

$$480x + 7200 = 570x$$

$$\frac{7200}{90} = \frac{90x}{90}$$

$$80 = x$$

$$x+15 = 95$$

$$12. 0 = -5d^2 + 24d + 30$$

$$d = \frac{-24 \pm 34.3}{-10}$$

$$d = 5.8 \text{ m}$$

4.8

$$4x^2 - 7 = y$$

$$4x^2 + 13 = 4x^2$$

$$h - 30 = -5d^2 + 24d$$

$$h - 30 = -5(d^2 - \frac{24}{5}d) + \frac{144}{25}$$

$$h - \frac{5070}{25} = -5(d - \frac{12}{5})^2$$

$$h = -5(d - \frac{12}{5})^2 + \frac{5070}{25}$$

$$\frac{24}{5} \cdot \frac{1}{2} = \frac{24}{10}$$

$$\frac{144}{25} = \frac{7}{25}$$

$$\frac{144}{25} - \frac{30}{1} = \frac{2}{25}$$

25

$$13. y = -4.9(t+5)(t+5) + 300$$

$$y = -4.9(t^2 - 10t + 25) + 300$$

$$y = -4.9t^2 + 49t - 122.5 + 300$$

$$y = -4.9t^2 + 49t + 177.5$$

$$-4t + 300 = -4.9t^2 + 49t + 177.5 \quad 270 \text{ m}$$

$$4.9t^2 + 45t + 122.5 = 0$$

5.76

$$270 = -4t + 300$$

$$-30 = -4t$$

$$7.5 = t$$

15.



$$P = 42$$

$$\sqrt{l^2 + w^2} = 15$$

$$P = 2l + 2w$$

$$42 = 2l + 2w$$

$$\sqrt{\left(\frac{42-2w}{2}\right)^2 + w^2} = 15$$

$$(21-w)(21-w)$$

$$441 - 42w + w^2$$

$$\frac{42-2w}{2} = l$$

$$21-w = l$$

$$\sqrt{(21-w)^2 + w^2} = 15$$

$$(21-w)^2 + w^2 = 225$$

$$2w^2 - 42w + 441 = 225$$

$$2w^2 - 42w + 216 = 0$$

$$w^2 - 21w + 108 = 0$$

$$(w-9)(w-12) = 0$$

$$w = 9, 12$$

$$\begin{array}{r} 108 \\ 2 \ 54 \\ 3 \ 36 \\ 4 \ 27 \\ -9 \ -12 \end{array}$$

$$\begin{array}{r} 80 \\ 4 \ 20 \\ \quad 4 \ 5 \end{array}$$

$$\sqrt{80x^4y^4} = z$$

$$4x^2y^2\sqrt{5}$$

$$22. a) 0 = 2\pi\sqrt{\frac{l}{32}}$$

$$0 = \sqrt{\frac{l}{32}}$$

$$0 = \frac{l}{32}$$

$$0 = l$$