

Grade Nine Math Exam Review

Numeracy Skills

1. Insert the appropriate symbol, $<$, $>$, or $=$ to make a true statement.

a) $\frac{1}{3}$ $\frac{13}{39}$

b) $\frac{3}{7}$ $\frac{10}{19}$

c) $-\frac{5}{3}$ $-1\frac{1}{3}$

2. Given the rational number, $\frac{16}{11}$, the period is _____ and the length of the period is _____.

3. Write $-4\frac{7}{8}$ as an improper fraction and as a decimal.

4. Write 0.08 as a fraction in lowest terms and as a percent.

5. Evaluate showing all steps.

a) $-4 + 14 \div (-2)$ b) $5 + 2(6 - 4)^3$ c) $(7 - 4 \div 4)(2 \times 6 - 14)$ d) $\frac{-1 - 2(3)}{(3 + 4)^3}$

6. Simplify. Show all steps. Express answer in reduced rational form.

a) $\frac{3}{5} - \frac{1}{3}$

b) $\frac{-3}{4} + \left(-1\frac{2}{3}\right)$

c) $4\frac{1}{2} \div 1\frac{1}{6}$

d) $-\frac{5}{7} \times \frac{14}{15}$

e) $\frac{2}{5} - \frac{-7}{4} \times \frac{8}{15}$

f) $-3\frac{1}{3} \div \left(1\frac{3}{4} - 1\frac{5}{6}\right)$

7. Simplify using exponent laws.

a) $x^5 \div x^3$

b) $r^7 \cdot r^{-3}$

c) $\frac{3h^4}{6h^{-2}}$

d) $\frac{x^2 \cdot x^{-3} \cdot 4}{x^5}$

e) $t^2 r^6 \times r^2 t^3$

f) $(5fg^3h^2)^4$

g) $m^{-3} \times m^5 \div m^{-2}$

h) $\frac{(xy^{-2})^3 (x^1 y^{-4})^{-2}}{(3xy^2)^2}$

8. Evaluate. Express answers in rational form (no decimals).

a) 5^{-3}

b) $7^2 \cdot 0$

c) $\left(\frac{3}{2}\right)^{-2}$

d) $\left(\frac{3}{4}\right)^{-1} + \left(\frac{2}{5}\right)^{-2}$

e) $4^{-1} \div 3^{-1} + (-1)^7 \times 18^0$

9. Express in scientific notation.

a) 0.000000506

b) 41300000000

10. Express in decimal form.

a) 1.78×10^8

b) 2.09×10^{-7}

11. Evaluate.

a) $(3.5 \times 10^6) \times (2.7 \times 10^{11})$

b) $(3.5 \times 10^{-12}) \times (7.0 \times 10^{-5})$

12. Evaluate 32% out of 4200.
13. 15 is what percent of 48?
14. If six muffins cost \$2.29, how much does one muffin cost?
15. Express “60 cm of snow in 12 hr” as a unit rate.
16. Write an equivalent ratio for 3 : 5
17. Reduce each ratio to lowest terms. a) 9 : 3 : 6 b) $\frac{30}{42}$
18. Find the unit cost of each of the following to determine which is the better value.
- 8 CDs for \$56.99, or 3 CDs for \$22.99
19. If 12 bananas cost \$1.58, how much will 22 bananas cost?
20. Tim Horton’s sells 1548 coffees in three days, how many coffees will be sold in one week?
21. Brandon asked 15 people for donations for the Tsunami Fund. He received \$2 from 8 people, \$1 from 4 people, and \$0 from 3 people. If she received money in the same ratio, how much would she collect from 60 people?

Algebra and Solving Equations

22. Determine a simplified expression for the volume of a cube with sides of $7x^3a^4$.
23. Simplify.
- a) $4x - 7x + x$ b) $2a - 3b - 4b - a$ c) $5y - 6y^2 - 2y + 8y^2$ d) $6(x - 3) - 2x$
- e) $(h + 4) + (2h - 4) - (3 - h)$ f) $5x(x + 2) - 2(x^2 - x)$ g) $3p - (2k + 4p) + k$
- h) $3(4m - 5m^2) + 2m(m - 9) - 3m(4 + 2m)$ i) $\frac{1}{2} 4d - 7 + \frac{4}{3} 6d + 3$
24. Factor.
- a) $25g - 5$ b) $16b^2 + 8b$ c) $14x^3 + 21x - 35x^2$ d) $20p^3q^5 - 40p^2q^4 + 80q^3p^4$
25. Simplify.
- a) $(5a^3b^4)(-3a^2b^5)$ b) $(-x^{-4}y^5)(-3x^{-2}y)$ c) $\frac{12r^2 - 18r + 60}{6}$ d) $\frac{49a^3b^5 - 21a^4b^3}{7ab^3}$
26. Given $p = 0.4 + 6.6q$, if $p = -0.7$, find q .

27. Solve.

a) $3m = -18$ b) $12 = m + 4$ c) $-\frac{x}{4} = 7$ d) $3k + 4 = 13$

e) $7.4 = -7 + 3.6b$ f) $12 - 7x = 18 + 3x + 14$ g) $2(x-3) = -\frac{1}{2}(6+8x)$

h) $\frac{5}{6}k - \frac{3}{4} = \frac{1}{4}$ i) $\frac{2y}{3} - \frac{3y}{4} = -6$ j) $-4(3 + 2a) = 3a + 32$

k) $\frac{x-2}{3} + \frac{x+1}{2} = 4$ l) $\frac{2y+3}{5} = \frac{y+2}{3}$

28. Twice a number increased by 9 equals five times the number.

- a) Write an equation. b) Solve for the number

29. Rearrange the volume of a cone formula to isolate r.

30. Show that $d = -4$ is NOT a solution of $7d + 2 = 3d - 4$.

31. Write an equation for each of the following, then solve.

- a) Two times a number is 26
b) Three more than twice a number is 19.
c) 12 minus twice a number is 4 times the number.

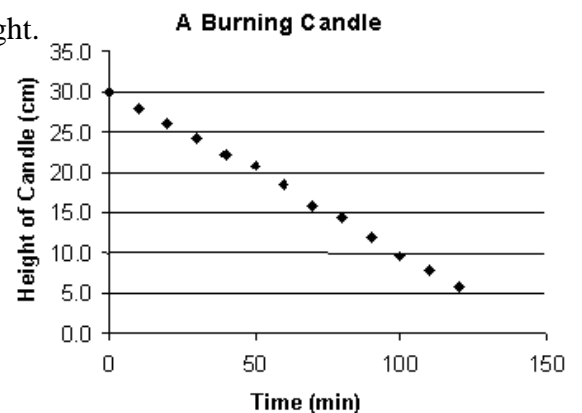
Trends in Data

32. Given the data in the chart below, predict if it is possible to sell 400 newspapers on the 6th day.

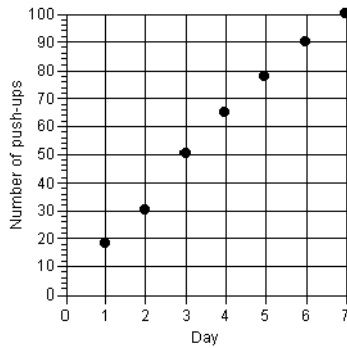
Days	1	2	3	4
Number of newspapers sold on given day	60	115	170	225

33. Answer the following questions for the graph at the right.

- a) What type of correlation is indicated?
b) State the trend between variables
c) Draw the line of best fit.
d) When will the candle be 22 cm?
e) How tall will the candle be after 140 minutes?
f) What is the average rate of change of candle height over time?



34.



Given the graph at the left determine:

- The independent variable.
- The dependent variable.
- Draw the line of best fit.
- State the trend.
- Predict the number of push-ups Erin will be able to do after 10 days. Justify.
- Did you interpolate or extrapolate in e?
 - f

35. Graph the data below and determine the mean fit line.

Day	Number of push-ups
1	18
2	30
3	50
4	65
5	78
6	90
7	100

Linear and Nonlinear Models

36. The cost of a banquet at Minos is \$300 for the room rental, plus \$20 for each person.

- State the dependent and independent variable.
- Make a table of values calculating the cost for people up to 60 using a scale of 10.
- Graph the relation.
- Use the graph to find the cost for 54 people
- Is the relationship a partial variation or a direct variation?
- Write an equation relating the two variables.
- Use the equation to find the cost for 54 people.

37. Krista ran 4 km in 20 minutes .Calculate her average rate of change of distance over time.

38. Ted baby sits and earns \$6/hour.

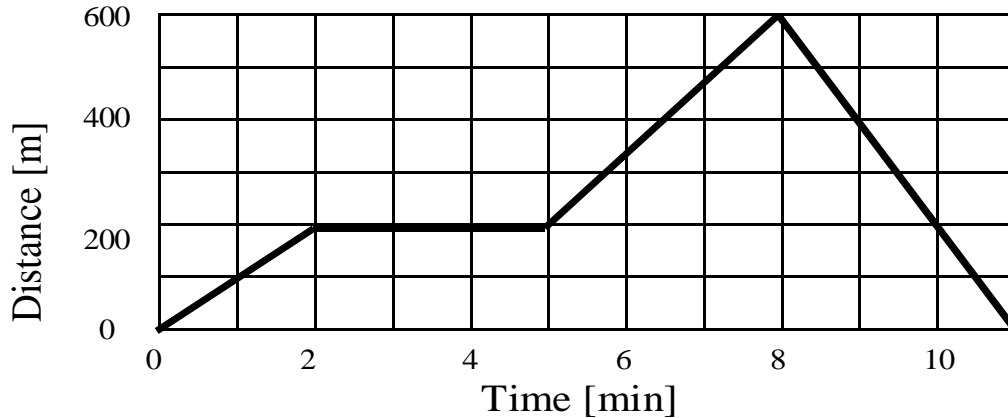
- State the base fee and rate.
- Is the model partial or direct?
- Write and algebraic model.

39. Given the table below find an equation modelling weight over time.

Time (weeks)	1	2	3	4	5	6
Weight (kg)	68	71	74	77	80	83

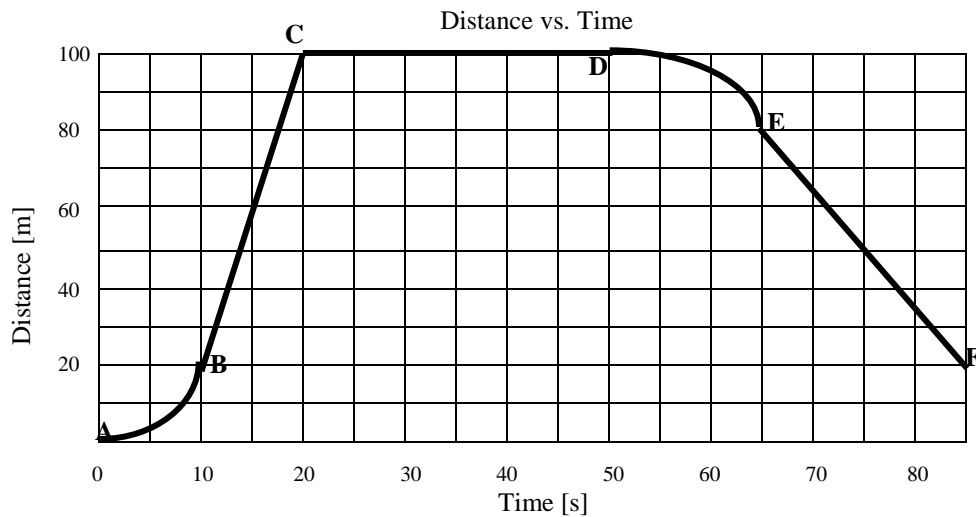
40. a) Compare these three phone companies by graphing. b) Write an equation for each company.
- Bell: A base fee of \$40 plus \$2/h
 Sprint: \$5/h plus a base fee of \$20
 Telus: \$10/h.

41. a) When is Susie walking, jogging, and running? Justify.



b) Calculate Susie's average speed for the first 8 minutes.

42. The following graph displays an objects movement with respect to time.



- During what time interval is the object traveling the slowest, but not stopped? Stopped?
- Describe the objects movement during the interval AB.
- Determine the average velocity between D and F.
- Write a story describing the movement of the object.

43. Given the table of values below state the following:

x	2	3	4	5	6	7	8
y	18	15	12	9	6	3	0

- The independent and dependent variables.
- The value of the y-intercept.
- The rate of change.

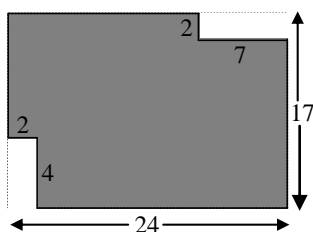
44. Fill in the missing value in the table below.

x	1	2	3	4	5	6
y	30	26	22		14	10

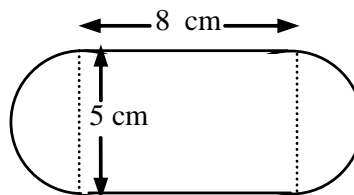
3D Geometry

53. Calculate the perimeter and area of the figures below.

a)

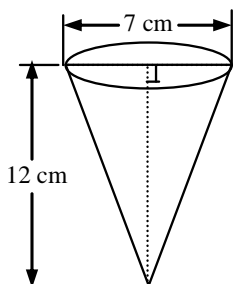


b)

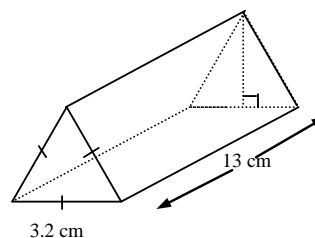


54. Calculate the surface area of the figures below.

a)



b)



55. If a rectangle has an area of 870 m^2 and a length of 16m, what is its width?

56. If a square based pyramid has a volume of 900 cm^3 , and a base side length of 10 cm, what is the height?

57. Find the volume of:

a) A cone with a height and diameter of 14 cm.

b) A tent in the shape of an isosceles triangular prism with a height of 4 m, width of 6 m and a length of 12 m.

58. If the tent in 57b) needs a new roof and floor (the triangular ends are OK!) and 10% extra material is needed for the seams, how much will it cost if the material costs $\$9.65/\text{m}^2$?

59. What is the maximum number of packs of cards with dimensions 2 cm by 5 cm by 7 cm that can be stacked into a box with dimensions 50 cm by 20 cm by 35 cm?

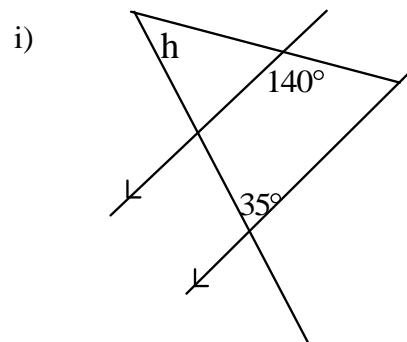
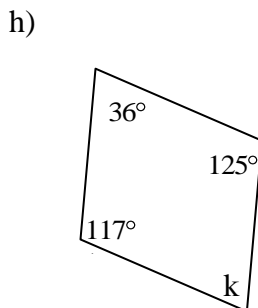
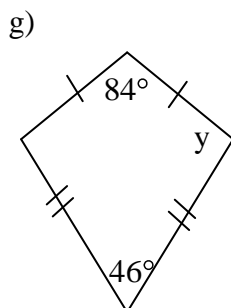
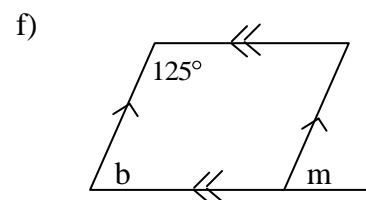
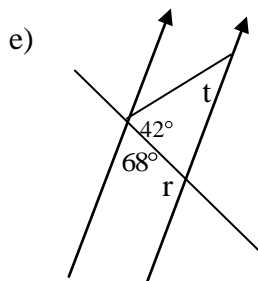
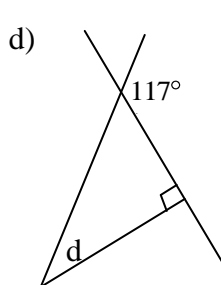
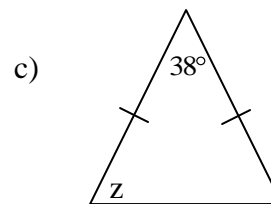
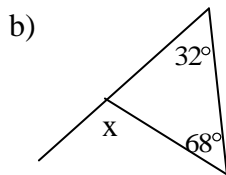
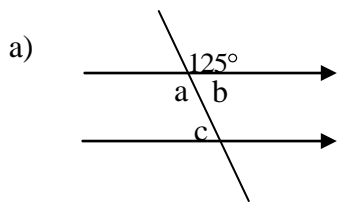
60. A tower has a cylindrical base topped with an inverted cone. The cone has a height of 4 m. The entire tower's height is 16 m and radius is 3 m.

a) Determine the towers volume.

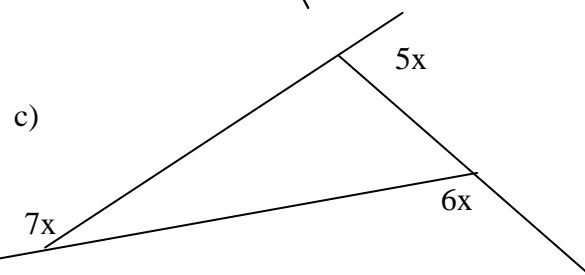
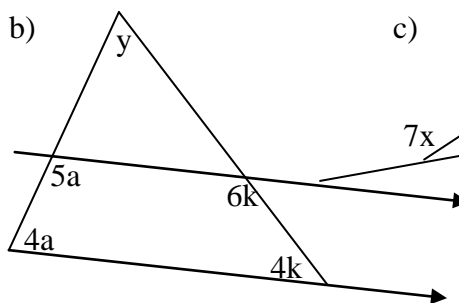
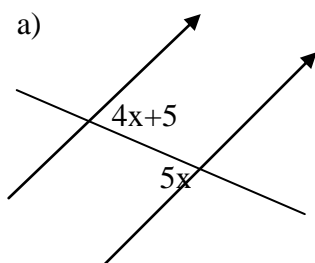
b) The tower needs to be painted on the outside (excluding the bottom). How much will it cost to paint the tower with one coat of paint if paint costs $\$0.50/\text{m}^2$

2D Geometry

61. Determine the unknowns in each of the following:



62. Solve for the unknowns in each of the following:



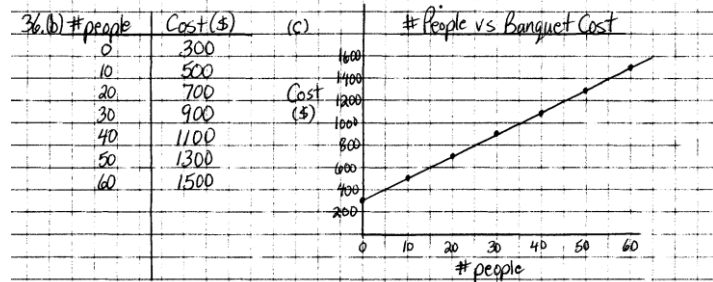
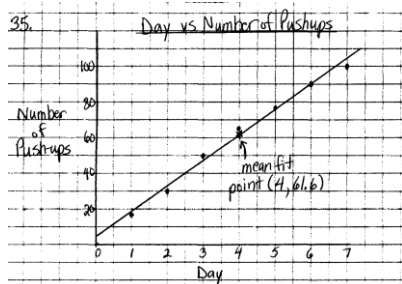
63. Determine the measure of an exterior angle of a regular pentagon.

64. Determine the measure of an interior angle of a regular hexagon.

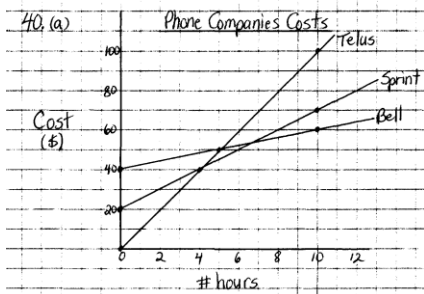
TEXT BOOK REVIEW: page 178 # 4, 13, 15-23
 page 356 # 1-18
 page 520 # 1-4, 9-13

ANSWERS

1. a) = b) < c) < 2. period = 45, length = 2 3. $-\frac{39}{8}, -4.875$ 4. $\frac{2}{25}, 8\%$ 5. a) -11, b) 21 c) -12
 d) $-\frac{1}{49}$ 6. a) $\frac{4}{15}$ b) $-\frac{29}{12}$ c) $\frac{27}{7}$ d) $-\frac{2}{3}$ e) $\frac{4}{3}$ f) 40 7. a) x^2 b) r^4 c) $\frac{h^6}{2}$ d) x^{-15} e) t^5r^8
 f) $625f^4g^{12}h^8$ g) m^4 h) $\frac{1}{9}x^{-1}y^{-2}$ 8. a) $\frac{1}{125}$ b) 0 c) $\frac{4}{9}$ d) $\frac{91}{12}$ e) $-\frac{1}{4}$ 9. a) 5.06×10^{-7} b) 4.13×10^{10}
 10. a) 178 000 000 b) 0.000 000 209 11. a) 9.45×10^{17} b) 2.45×10^{-16} 12. 1344 13. 31.25% 14. \$0.38
 15. 5 cm/h 16. 6:10 17. a) 3:1:2 b) $\frac{5}{7}$ 18. \$7.12/CD vs \$7.66/CD, 8 CDs is better 19. \$2.90 20. 3612
 21. \$80 22. $343x^9a^{12}$ 23. a) $-2x$ b) $a-7b$ c) $3y+2y^2$ d) $4x-18$ e) $4h-3$ f) $3x^3+12x$ g) $-p-k$
 h) $-19m^2-18m$ i) $10d+\frac{1}{2}$ 24. a) $5(5g-1)$ b) $8b(2b+1)$ c) $7x(2x^2+3-5x)$ d) $20p^2q^3(pq^2-2q+4p^2)$
 25. a) $-15a^5b^9$ b) $3x^{-6}y^6$ c) $2r^2-3r+10$ d) $7a^2b^2-3a^3$ 26. -0.167 27. a) -6 b) 8 c) -28 d) 3 e) 4
 f) -2 g) $\frac{1}{2}$ h) $\frac{6}{5}$ i) 72 j) -4 k) 5 l) 1 28. a) $2x+9=5x$ b) 3 29. $r = \sqrt{\frac{3V}{\pi h}}$ 30. LS = -26, RS = -16
 31. a) $2x=26, x=13$ b) $3+2x=19, x=8$ c) $2x-12=4x, x=-6$ 32. no
 33. a) strong, negative b) as time increases, height of candle decreases d) 40 min e) 2 cm f) -0.2 cm/min
 34. a) day b) number of push-ups d) as the days increase, the number of push-ups increase e) 130
 f) extrapolate



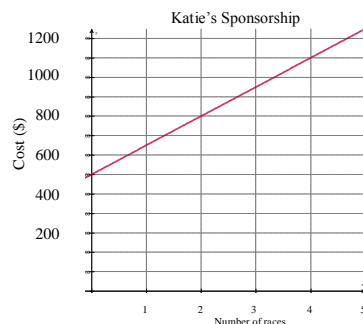
36. a) dependent is cost, independent is number of people d) \$1350 e) partial f) $C = 20n + 300$ g) \$1380
 37. 0.2 km/min 38. a) base fee = 0, rate = \$6/h b) direct c) $E = 6t$ 39. $W = 3t + 65$



40. b) Bell: $C = 2t + 40$, Sprint: $C = 5t + 20$, Telus: $C = 10t$
 41. a) walking 0 - 2 min, jogging 5 - 8 min, running 8 - 11 min
 b) 75 m/min
 42. a) 65 - 85s, stopped 20 - 50s b) accelerating c) -2 m/s
 43. a) independent is x, dependent is y b) 24 c) -3
 44. 18
 45. a) $y = -4x + 9$ b) $y = 3x - 2$ c) $y = -3x - 5$ d) $C = 150r + 600$
 e) $C = 0.07m + 14.30$ f) $y = 3x - 10$ g) $y = x + 5$ h) $y = -4$

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Cost (\$)	# of races
0	600
1	750
2	900
3	1050
4	1200
5	1350

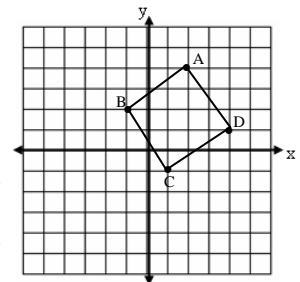


47. $y = -4x - 5$

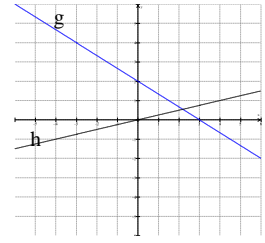
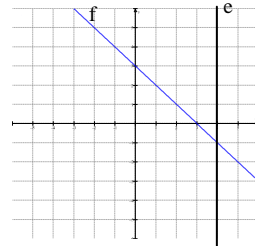
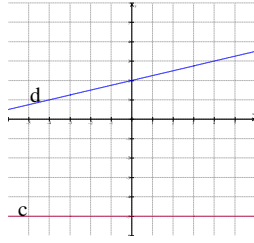
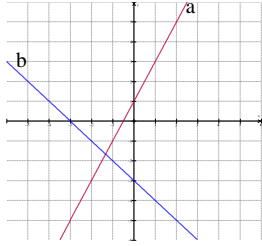
48.

Slope BA = Slope CD = $\frac{2}{3}$

Slope BC = Slope AD = $\frac{3}{2}$



49.



50. a) $y = \frac{1}{2}x$

b) $y = -\frac{1}{2}x + 3$

c) $y = \frac{3}{2}x + 2$

d) $y = -3$

51. a) $2x - 3y - 15 = 0$

b) $4x + y - 1 = 0$

52. a) $y = 2x + 3$

b) $y = -\frac{1}{2}x + \frac{9}{2}$

53. a) $P = 82 \text{ units}$, $A = 386 \text{ units}^2$

b) $P = 31.7 \text{ cm}$, $A = 59.6 \text{ cm}^2$

54. a) 165 cm^2 b) 133.5 cm^2

55. 54.375 m

56. 27 cm

57. a) 718 cm^3

b) 144 cm^3

58. 192 m^2 , $\$2038.08$

59. 500

60. a) 377 m^3 b) 273 m^2 , $\$186.50$

61. a) $a = 125^\circ$, $b = 55^\circ$, $c = 55^\circ$ b) $x = 100^\circ$ c) $z = 71^\circ$

d) $d = 27^\circ$ e) $r = 112^\circ$, $t = 70^\circ$ f) $b = 55^\circ$, $m = 55^\circ$ g) $y = 115^\circ$ h) $k = 82^\circ$ i) $h = 105^\circ$

62. a) $x = 5$

b) $a = 20$, $k = 18$, $y = 28^\circ$

c) $x = 20$

63. 72°

64. 120°