

Algebra 1B
1st Semester Final Exam Review

Name _____
 Block _____ Date _____

Calculator NOT Allowed

1. Find the slope of the line passing through the points (-1, 4) and (3, -2). (Section 6-1)

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-2)}{-1 - 3} = \frac{6}{-4} = \boxed{-\frac{3}{2}}$$

2. Write an equation in slope-intercept form of the line passing through the points (8, 7) and (-12, 2). (Section 6-2)

1st: Slope = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 2}{8 - (-12)} = \frac{5}{20} = \frac{1}{4}$

2nd: Pick a Point... & use Point-Slope Form: $y - 7 = \frac{1}{4}(x - 8)$
 (8, 7)

$$y - 7 = \frac{1}{4}x - 2$$

$$\boxed{y = \frac{1}{4}x + 5}$$

3. Write an equation in point-slope form of the line passing through the points (-5, 16) and (-2, 4). (Section 6-5)

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{16 - 4}{-5 - (-2)} = \frac{12}{-3} = -4$$

$$\boxed{y - 4 = -4(x + 2)}$$

OR

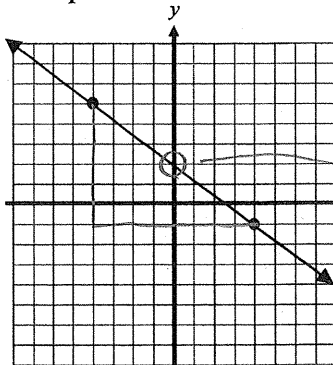
$$\boxed{y - 16 = -4(x + 5)}$$

4. Write the equations of the horizontal and vertical lines that pass through the point (7, -3)? (Section 6-2)

$$y = \# \quad x = \#$$

$$\boxed{\begin{array}{l} \text{Horizontal: } y = -3 \\ \text{Vertical: } x = 7 \end{array}}$$

5. Write the equation of the line below. (Section 6-2)

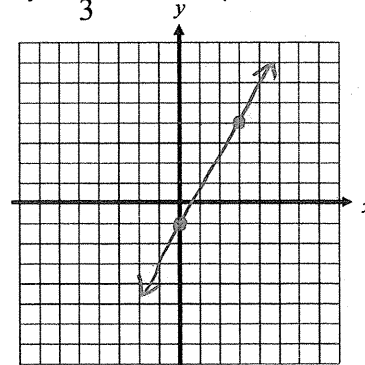


Slope = $\frac{\text{Down } 6}{\text{Right } 8} = \frac{-6}{8} = -\frac{3}{4}$

$y\text{-int} = 2$

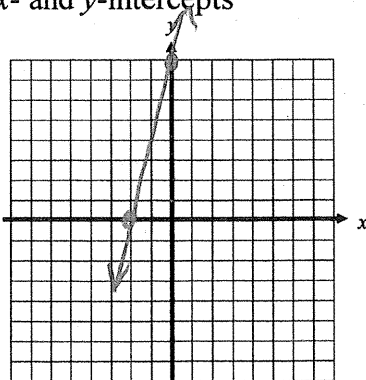
$$\boxed{y = -\frac{3}{4}x + 2}$$

6. Graph: $y = \frac{5}{3}x - 1$ (Section 6-2)



Start @ $y = -1$
 Slope = $\frac{5}{3}$ ↑ →

7. Graph: $16x - 4y = -32$ (Section 6-4)
 using x- and y-intercepts

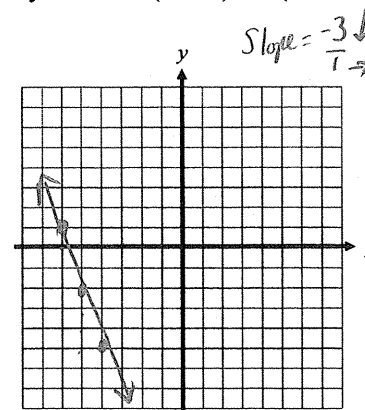


x	y
0	8
-2	0

← $-4y = -32$
 $y = 8$

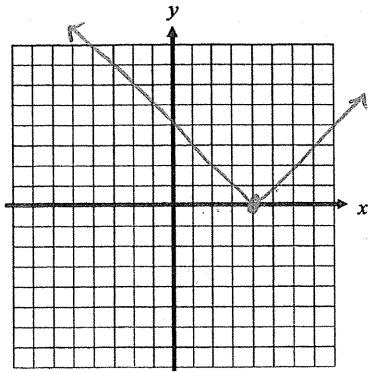
$16x = -32$
 $x = -2$

8. Graph: $y - 1 = -3(x + 6)$ (Section 6-5)



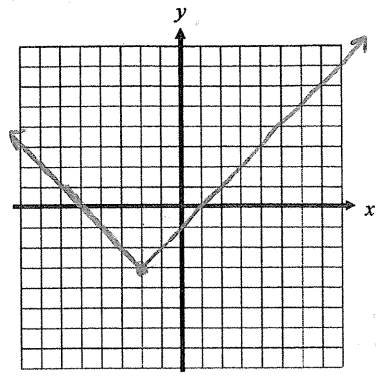
Slope = $\frac{-3}{1}$ ↓
 Point: (-6, 1)

9. Graph: $y = |x - 4|$ (Section 6-8)



$y = |x|$
moves
Right 4

10. Graph: $y = |x + 2| - 3$ (Section 6-8)

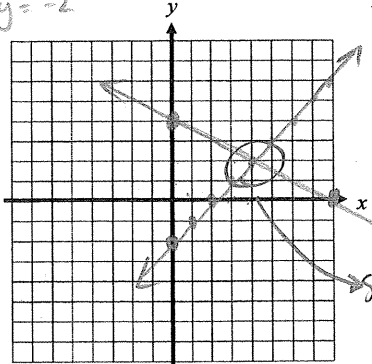


$y = |x|$
moves
left 2
Down 3

11. Solve graphically: $y = x - 2$ (Section 7-1)

$x + 2y = 8$

Start @ $y = -2$
Slope = $\frac{1}{1} \rightarrow$



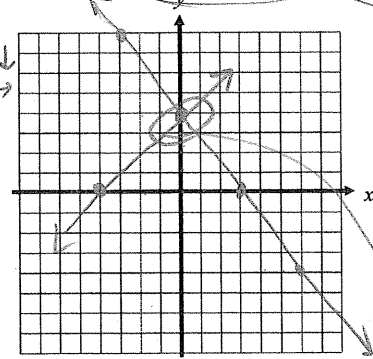
$\begin{array}{r|l} x & y \\ \hline 0 & 4 \\ 8 & 0 \end{array}$ \leftarrow $2y = 8$
 $y = 4$
 $x = 8$

Solution $(4, 2)$

12. Solve graphically: $y = -\frac{4}{3}x + 4$ (Section 7-1)

$y - x = 4$

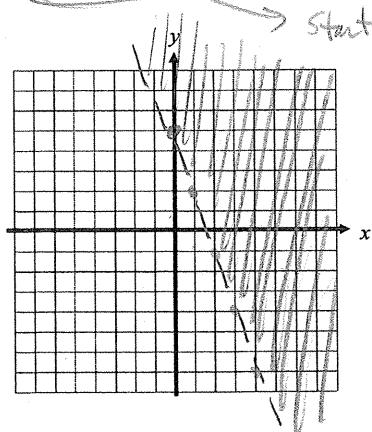
Start @ $y = 4$
Slope = $-\frac{4}{3} \downarrow$



$\begin{array}{r|l} x & y \\ \hline 0 & 4 \\ -4 & 0 \end{array}$ \leftarrow $y = 4$
 $-x = 4$
 $x = -4$

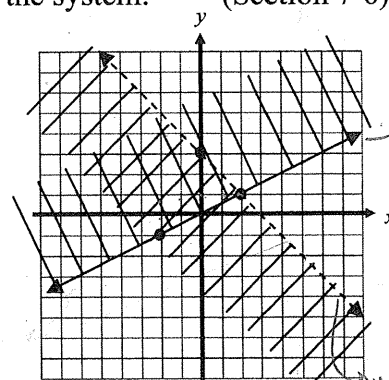
Solution $(0, 4)$

13. Graph: $y > -3x + 5$ (Section 7-5)



Start @ $y = 5$
Slope = $-\frac{3}{1} \downarrow$
 $y > -3x + 5$
Dotted Line
Shade Above

14. Given the graph of the inequalities, write the system. (Section 7-6)



Slope = $\frac{y \uparrow 2}{\text{Right } 4} = \frac{2}{4} = \frac{1}{2}$
 $y - \text{int} = 0$
Shaded Above
Solid line
 $y \geq \frac{1}{2}x$

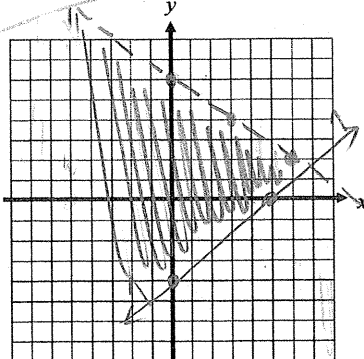
$y - \text{int} = 3$
Slope = $\frac{\text{Down } 2}{\text{Right } 2} = -\frac{2}{2} = -1$
 $x > -3$

15. Graph the system of inequalities: $y < -\frac{2}{3}x + 6$

$-4x + 5y \geq -20$

(Section 7-6)

Start @ $y = 6$
Slope = $-\frac{2}{3} \downarrow$



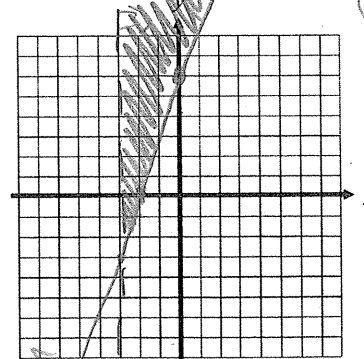
$y < -\frac{2}{3}x + 6$
Dotted Line
Shade Below

$\begin{array}{r|l} x & y \\ \hline 0 & -4 \\ 5 & 0 \end{array}$ \leftarrow $5y = -20$
 $y = -4$

$-4x = -20$
 $x = 5$
Test $(0, 0) \dots$ Is $0 \geq -20$? Yes!
So shade $(0, 0)$ side

16. Graph the system of inequalities: $-3x + y \geq 6$

Vertical Line (Dotted)
(Section 7-6) (Shade Right)



$\begin{array}{r|l} x & y \\ \hline 0 & 6 \\ -2 & 0 \end{array}$ \leftarrow $y = 0$
Solid Line
 $-3x = 6$ Test $(0, 0)$ Is $0 \geq 6$? NO!
Dnt shade $(0, 0)$ side!

Rewrite each number in standard notation. (Section 8-2)

17. 8.43×10^7

$84,300,000$

18. 4.75×10^{-4}

$.000475$

Rewrite each number in scientific notation. (Section 8-2)

19. 0.0000832

8.32×10^{-5}

20. 9,540,000

9.54×10^6

Simplify each expression. (Sections 8-1, 8-3 to 8-5)

21. $24^0 = 1$

22. $4^{-3} = \frac{1}{4^3} = \frac{1}{64}$

23. $4a^{-5} = \frac{4}{a^5}$

24. $\frac{n^{-3}}{4m^{-2}} = \frac{m^2}{4n^3}$

25. $(8d^4)(4d^7) = 32d^{11}$

26. $(-2d^3e^{-7})(6d^4e^5) = -12d^7e^{-2} = \frac{-12d^7}{e^2}$

27. $(x^2y)^4 = x^8y^4$

28. $(4x^4)^3(2xy^3)^2$
 $4^3 x^{12} \cdot 2^2 x^2 y^6$
 $64 x^{12} \cdot 4 x^2 y^6$
 $256 x^{14} y^6$

29. $(4^{-1}s^3)^{-2} = 4^2s^{-6} = \frac{16}{s^6}$

30. $\left(\frac{a^3}{b^2}\right)^4 = \frac{a^{12}}{b^8}$

31. $(c^8d^0)(c^{-5}) = c^3$

32. $\left(\frac{2^3m^4n^{-1}}{p^2}\right)^0 = 1$

33. $\left(\frac{2g^4}{g^9}\right)^3 = \frac{2^3 g^{12}}{g^{27}} = \frac{8}{g^{15}}$

34. $\frac{a^6b^{-5}}{a^{-2}b^7} = \frac{a^8}{b^{12}}$

35. $\left(\frac{3x^{-3}y}{xz^{-4}}\right)^{-2} = \frac{3^{-2} x^6 y^{-2}}{x^{-2} z^8} = \frac{x^2 x^6 y^{-2}}{3^2 y^2 z^8} = \frac{x^8}{9y^2 z^8}$

$$36. 16^{1/4} = \sqrt[4]{16} = \boxed{2}$$

$$37. 25^{-1/2} = \frac{1}{25^{1/2}} = \frac{1}{\sqrt{25}} = \boxed{\frac{1}{5}}$$

$$38. 9^{1/8} \cdot 9^{3/8} = 9^{4/8} = 9^{1/2} = \sqrt{9} = \boxed{3}$$

$$39. \frac{4^{7/2}}{4^{1/2}} = 4^{6/2} = 4^3 = \boxed{64}$$

$$40. (27^{2/3})^{4/3} = 27^{8/9} = \sqrt[3]{27^8} = \sqrt[3]{27^6 \cdot 27^2} = \sqrt[3]{27^6} \cdot \sqrt[3]{27^2} = 27^2 \cdot \sqrt[3]{27^2} = 27^2 \cdot 3 = \boxed{3}$$

$$41. (p^{3/4} r^6 s^0)^{2/3} = p^{1/2} r^4 = \boxed{p^{1/2} r^4}$$

Simplify. Write each answer in scientific notation. (Sections 8-2 to 8-5)

$$42. 5(2.38 \times 10^{-4})$$

$$\begin{array}{r} 1.4 \\ 2.38 \\ \times 5 \\ \hline 11.90 \end{array} \quad 11.9 \times 10^{-4} = \boxed{1.19 \times 10^{-3}}$$

$$43. 3(0.12 \times 10^6)$$

$$\begin{array}{r} .12 \\ \times 3 \\ \hline .36 \end{array} \quad .36 \times 10^6 = \boxed{3.6 \times 10^5}$$

$$44. (4 \times 10^{-9})(4.1 \times 10^{-8})$$

$$\begin{array}{r} 4.1 \\ \times 4 \\ \hline 16.4 \end{array} \quad 16.4 \times 10^{-17} = 10^{-9} \cdot 10^{-8} = 10^{-17} = \boxed{1.64 \times 10^{-16}}$$

$$45. (3 \times 10^8)(2.6 \times 10^{-15})$$

$$\begin{array}{r} 2.6 \\ \times 3 \\ \hline 7.8 \end{array} \quad 7.8 \times 10^{-7} = 10^8 \cdot 10^{-15} = 10^{-7} = \boxed{7.8 \times 10^{-7}}$$

$$46. (9 \times 10^7)^2$$

$$9^2 \times 10^{14} = 81 \times 10^{14} = \boxed{8.1 \times 10^{15}}$$

$$47. (3 \times 10^{-6})^3$$

$$3^3 \times 10^{-18} = 27 \times 10^{-18} = \boxed{2.7 \times 10^{-17}}$$

$$48. 10^{-3} \cdot (2 \times 10^{-2})^5$$

$$10^{-3} \cdot 2^5 \times 10^{-10} = 32 \times 10^{-13} = \boxed{3.2 \times 10^{-12}}$$

$$49. \frac{7.2 \times 10^4}{9 \times 10^6}$$

$$\begin{array}{r} 7.2 \\ \times 9 \\ \hline 64.8 \end{array} \quad .8 \times 10^{-2} = \frac{10^4}{10^6} = 10^{-2} = \boxed{8 \times 10^{-3}}$$

$$50. \frac{3.6 \times 10^3}{0.4 \times 10^{-8}}$$

$$\begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array} \quad 9 \times 10^{11} = \frac{10^3}{10^{-8}} = 10^{11} = \boxed{9 \times 10^{11}}$$

51. Light travels 5.87×10^{12} miles in one year. This distance is called a light-year. Suppose a star is 2×10^4 light-years away. How many miles away is this star? Write your answer in scientific notation.

$$(5.87 \times 10^{12})(2 \times 10^4) = 11.74 \times 10^{16}$$

$$\begin{array}{r} 5.87 \\ \times 2 \\ \hline 11.74 \end{array} = \boxed{1.174 \times 10^{17}}$$

Graphing Calculator Allowed

Solve each system using substitution. (Section 7-2)

52. $y = 3x - 9$
 $x + 2y = 10$

$$\begin{aligned} x + 2(3x - 9) &= 10 \\ x + 6x - 18 &= 10 \\ 7x - 18 &= 10 \\ 7x &= 28 \\ x &= 4 \end{aligned}$$

$$\begin{aligned} y &= 3(4) - 9 \\ y &= 12 - 9 \\ y &= 3 \end{aligned}$$

$(4, 3)$

53. $y = 4x + 8$
 $y = 2x - 4$

$$\begin{aligned} (4x + 8) &= 2x - 4 \\ 4x + 8 &= 2x - 4 \\ 2x &= -12 \\ x &= -6 \end{aligned}$$

$$\begin{aligned} y &= 4(-6) + 8 \\ y &= -24 + 8 \\ y &= -16 \end{aligned}$$

$(-6, -16)$

Solve each system using elimination. (Section 7-3)

54. $(6x + 11y = 12) \cdot 2$
 $12x + 22y = 10$

$$\begin{aligned} -12x - 22y &= -24 \\ 12x + 22y &= 10 \\ \hline 0 &= -14 \end{aligned}$$

NOT TRUE!

NO SOLUTIONS

55. $(4x - 3y = 11) \cdot 3$
 $(3x - 5y = -11) \cdot 4$

$$\begin{aligned} 4x - 3(7) &= 11 \\ 4x - 21 &= 11 \\ 4x &= 32 \\ x &= 8 \end{aligned}$$

$$\begin{aligned} -12x + 9y &= -33 \\ 12x - 20y &= -44 \\ \hline -11y &= -77 \\ y &= 7 \end{aligned}$$

$(8, 7)$

56. At a high school football game, 500 tickets were sold. Adult tickets cost \$5 and student tickets cost \$3. If the total amount collected was \$2300, write and solve a system of linear equations to find out how many adult tickets and student tickets were sold? (Section 7-4)

a = # of adult tickets
 s = # of student tickets

$$\begin{aligned} a + s &= 500 \\ 5a + 3s &= 2300 \end{aligned}$$

$$\begin{aligned} a &= 500 - s \\ 5(500 - s) + 3s &= 2300 \\ 2500 - 5s + 3s &= 2300 \\ 2500 - 2s &= 2300 \\ -2s &= -200 \\ s &= 100 \end{aligned}$$

$$\begin{aligned} a &= 500 - 100 \\ a &= 400 \end{aligned}$$

400 ADULT TICKETS
 100 STUDENT TICKETS

57. You have \$30 in your bank account and deposit \$12 each week. At the same time your brother has \$255 but is withdrawing \$13 each week. Write and solve a system of linear equations to find out when your accounts will have the same balance. (Section 7-4)

w = # of weeks
 b = balance in account

You: $b = 30 + 12w$
 Brother: $b = 255 - 13w$

$$\begin{aligned} 30 + 12w &= 255 - 13w \\ 25w &= 225 \\ w &= 9 \end{aligned}$$

9 weeks

58. Suppose you bought supplies for a party. Three rolls of streamers and 15 party hats cost \$30. Later, you bought 2 rolls of streamers and 4 party hats for \$11. Write and solve a system of linear equations to find the cost of each roll of streamers and each party hat. (Section 7-4)

r = cost of a roll of streamers
 p = cost of a party hat

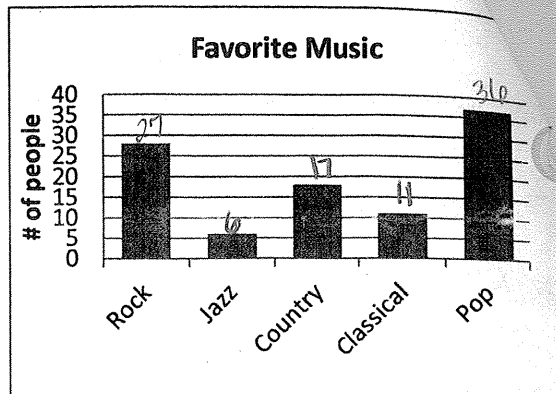
$$\begin{aligned} 3r + 15p &= 30 \\ 2r + 4p &= 11 \end{aligned}$$

$$\begin{aligned} (3r + 15p = 30) \cdot 2 &\Rightarrow 6r + 30p = 60 \\ (2r + 4p = 11) \cdot 3 &\Rightarrow 6r + 12p = 33 \\ \hline -18p &= 27 \\ p &= \frac{27}{-18} = -\frac{3}{2} \\ p &= 1.50 \end{aligned}$$

Roll of streamers cost = \$2.50
 Party Hat = \$1.50

$$\begin{aligned} 2r + 4(1.50) &= 11 \\ 2r + 6 &= 11 \\ 2r &= 5 \\ r &= \frac{5}{2} = 2.50 \end{aligned}$$

59. A group of college students were surveyed about their favorite type of music. The bar graph shows the results. (Page 770)



- a. How many people were surveyed?
 $27 + 6 + 17 + 11 + 36 = 97$
- b. How many people like classical music best?

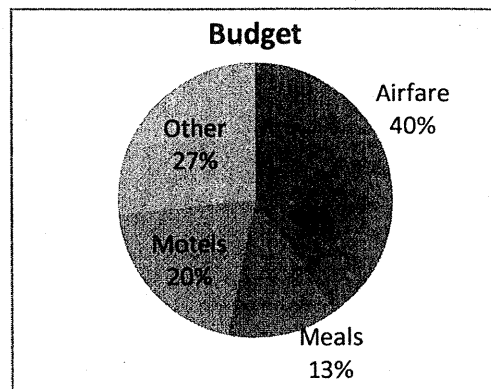
c. What is the most popular type of music?

d. What is the least popular type of music?

e. How many more people chose rock than chose country?

$27 - 17 = 10$

60. The Johnson Family is taking a vacation during spring break. They have created a plan for their budget. The circle graph displays their budget. (Page 773)



a. The Johnson's have saved \$3000 for their trip. How much money do they plan to spend on meals?

$13\% \text{ of } \$3000 \Rightarrow (0.13)(3000) = \390

b. The Johnson's have calculated that airfare will cost \$1200. How much money should they have in their total budget?

$40\% \times = 1200$
 $100\% \times = 1200 / 0.4 = 3000$

61. The conditional frequency table below shows the responses when students were asked whether they liked the game Monopoly.

	Liked	Disliked	No opinion	Total
Males	8	7	5	20
Females	14	2	3	19
Total	22	9	8	39

a. How many students liked Monopoly?

22

b. How many males were surveyed?

20

62. The following data represents the test scores on a chapter 8 test in Algebra 1: (Section 1-6)

86, 88, 90, 54, 81, 76, 72, 47, 63, 98, 78, 80, 69, 93, 97, 86, 83, 82, 67, 95, 96

a. Calculate the mean, median, mode, range, and standard deviation of the data.

$\bar{x} = 80.048$ $med = 82$ $\sigma = 13.699$ $mode = 86$ $Range = 98 - 47 = 51$

b. Calculate the 5-number summary of the data.

min = 47 $Q_1 = 70.5$ $med = 82$ $Q_3 = 91.5$ max = 98

c. Use the 1.5 IQR rule to determine if there are outliers.

$IQR = 91.5 - 70.5 = 21.0$

$1.5IQR = 31.5$

Any # $> Q_3 + 31.5 = 123$

Any # $< Q_1 - 31.5 = 39$

Since all the numbers are within this range, there are no outliers.

d. Which measure of central tendency best describes the test scores? Explain your reason.

since there are no outliers, the mean is the best

3. The stem-and-leaf plot depicts scores on a math quiz in Mrs. Smith's Calculus class. (Section 1-6)

Math Test Scores (out of 50 pts)	
Stem	Leaf
3	5 6 6 8
4	0 2 2 4 5 5 7 8 8 9
5	0 0

Legend: 3 | 6 means 36

a. What is the median of the data? 45

b. What is the range of the data? $50 - 35 = 15$

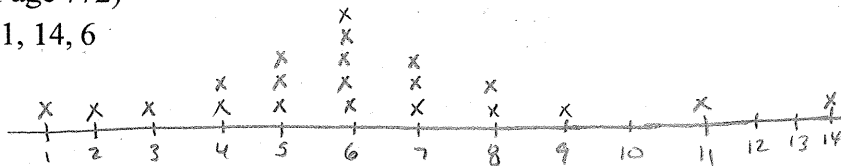
c. What is the standard deviation of the data?

$$s = 5.060$$

64. Nathan asked his classmates to estimate the number of hours they spend doing homework each week. The following data shows the results of his survey. (Page 772)

9, 4, 8, 2, 7, 3, 5, 6, 1, 4, 7, 6, 8, 5, 6, 5, 6, 7, 11, 14, 6

a. Make a dot plot of the data



b. What is the mean of the data?

$$\approx 6.190$$

c. What is the mode of the data?

$$6$$

65. The heights of the students in Mr. Jones' Geometry class are shown below. (Page 774)

63, 60, 67, 62, 58, 63, 68, 59, 62, 65, 56, 63, 59, 50, 62, 58

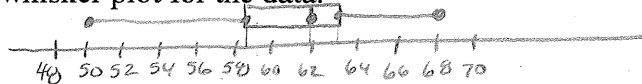
a. Calculate the 5-number summary of the data.

$$\text{min} = 50 \quad Q_1 = 58.5 \quad \text{med} = 62 \quad Q_3 = 63 \quad \text{max} = 68$$

b. Construct a box-and-whisker plot for the data.

* 1st make a # line

w/ equally spaced #'s



c. What heights are included in the middle 50% of the data?

$$58.5 \rightarrow 63 \rangle 59, 59, 60, 62, 62, 62, 63, 63, 63$$

d. Use the 1.5 IQR rule to determine if there are outliers.

$$IQR = 63 - 58.5 = 4.5$$

$$\text{Any } \# > Q_3 + 6.75 = 69.75$$

$$1.5 IQR = 6.75$$

$$\text{Any } \# < Q_1 - 6.75 = 51.75$$

Since $50 < 51.75$
50 is an outlier

66. The histogram at the right shows the times students ran the mile in gym class. (Page 771)

a. Which interval contains the fewest data values?

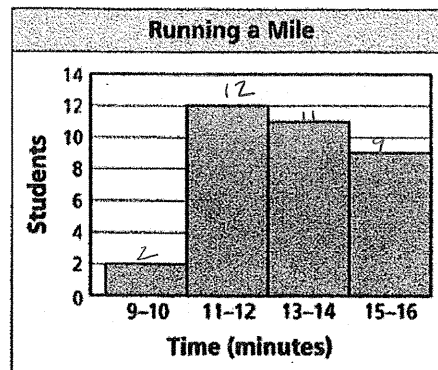
$$9-10$$

b. How many students are in the class?

$$2 + 12 + 11 + 9 = 34$$

c. How many students ran the mile in 12 minutes or less?

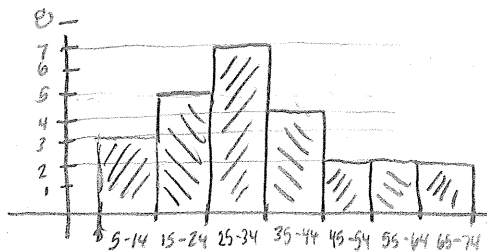
$$14$$



67. An internet company surveyed their users. The first 25 people who responded gave the ages shown below. Complete the frequency table and make a histogram to display the data. (Page 771)

25, 43, 65, 12, 8, 30, 44, 68, 18, 21, 25, 33, 37, 54, 61, 29, 31, 38, 22, 48, 19, 34, 55, 14, 21

Age	Tally	Frequency
5-14		3
15-24		5
25-34		7
35-44		4
45-54		2
55-64		2
65-74		2



68. Find each probability for one roll of a number cube. (Section 2-6)

a. $P(4) = \frac{1}{6}$

6 #'s

b. $P(\text{not } 4) = \frac{5}{6}$

c. $P(\text{odd number}) = \frac{3}{6} = \frac{1}{2}$

69. Use the spinner at the right to determine the following: (Section 2-6)

a. The odds in favor of a whale.

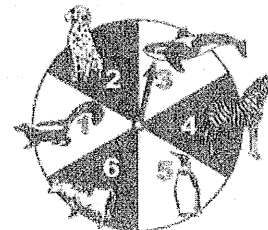
$1:5$

b. The odds in favor of a 4 legged animal.

$4:2$ or $2:1$

c. The odds against a 4 legged animal.

$2:4$ or $1:2$



70. A bakery inspects a sample of 800 pastries and finds that 12 are defective. Based on these data, what is the probability that a pastry is defective? (Section 2-6)

$$P(\text{defective}) = \frac{12}{800} = \frac{3}{200} = .015$$

71. Suppose you choose two numbers from a box containing ten cards with the numbers 1-10. State whether the two events are independent or dependent. Then find each probability. (Section 2-7)

a. $P(5 \text{ then an odd number})$ without replacing the card

Dependent

$$\frac{1}{10} \cdot \frac{4}{9} = \frac{2}{45} \approx .044$$

b. $P(2 \text{ and } 8)$ with replacing the card

Independent

$$\frac{1}{10} \cdot \frac{1}{10} = \frac{1}{100}$$

c. $P(\text{an even number then an odd number})$ without replacing the card

Dependent

$$\frac{5}{10} \cdot \frac{5}{9} = \frac{5}{18} \approx .278$$

d. $P(\text{an even number and an odd number})$ with replacing the card

Independent

$$\frac{5}{10} \cdot \frac{5}{10} = \frac{1}{4} = .25$$