Math 1100 Formula Sheet

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y = mx + b$$

Revenue Function $R(x) =$ (price per unit sold)x

Cost Function $C(x) =$ fixed cost + (cost per unit produced)x

Profit Function $P(x) = R(x) - C(x)$

Quadratic Equation or Function $y = ax^2 + bx + c$ or $f(x) = ax^2 + bx + c$

Vertex of a Parabola $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a} \right) \right)$

Simple Interest $I = Prt$

Future Value for Simple Interest $A = P(1 + rt)$

Compound Interest Paid n times per Year $A = P\left(1 + \frac{r}{n} \right)^{nt}$

Continuous Compound Interest $A = Pe^{rt}$

Calculating Present Value $P = \dfrac{A}{\left(1 + \frac{r}{n} \right)^{nt}}$

Effective Annual Yield $Y = \left(1 + \frac{r}{n} \right)^{n} - 1$

Value of an Annuity $A = \dfrac{P\left[\left(1 + \frac{r}{n} \right)^{nt} - 1 \right]}{\frac{r}{n}}$

Regular Payments Needed to Achieve a Financial Goal $P = \dfrac{A\left(\frac{r}{n} \right)}{\left[\left(1 + \frac{r}{n} \right)^{nt} - 1 \right]}$

Loan Payment Formula for Fixed Installment Loans $PMT = \dfrac{P\left(\frac{r}{n} \right)}{\left[1 - \left(1 + \frac{r}{n} \right)^{-nt} \right]}$

$$_nC_r = \frac{n!}{(n-r)!r!} \qquad\qquad _nP_r = \frac{n!}{(n-r)!}$$

Rectangular Solid: $V = Bh = (lw)h$

Pyramid: $V = \frac{1}{3}Bh$

Geometric Formulas

Cylinder: $V = \pi r^2 h$

Parallelogram: $A = bh$

Cone: $V = \frac{1}{3}\pi r^2 h$

Triangle: $A = \frac{1}{2}bh$

Sphere: $V = \frac{4}{3}\pi r^3$

Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$

Surface Area: add up the area of each face of the solid

Circles: $C = 2\pi r = \pi d$

$$A = \pi r^2$$

Review Problems

This review is a snapshot of the types of questions that will/may be on the Final Exam. This is not an exhaustive list of examples. You need to study beyond this review for the Final Exam, I encourage you to review past test reviews and tests. In addition to studying this review and knowing the vocabulary, I recommend studying the sample tests from the book or on MyMathLab. Each question on the sample tests has a video that you can watch for the solution.

Vocabulary

Chapter 1

- Sequence

- Polya's Four Step Process Set

Chapter 5
- Prime Number
- Composite Number
- Fundamental Theorem of Arithmetic
- Greatest Common Divisor
- Least Common Multiple
- The Associative Property
- The Commutative Property
- The Distributive Property
- Scientific Notation
- The Integers
- The Order of Operations
- Arithmetic Sequence
- Geometric Sequence
- Prime Factorization

Chapter 6
- Algebraic Expression (vs. Equation)
- Formula
- Mathematical Modeling
- Linear Equation
- Proportion
- Ratio
- Quadratic Equation

Chapter 7
- Coordinates
- Ordered pairs
- x- and y-intercepts
- origin
- function
- linear equation
- systems of equations
- quadratic equation
- vertex
- axis of symmetry
- roots or zeros
- exponential equation

Chapter 8
- Percent
- Sales Tax
- Discount
- Percent change
- Interest
- Rate (or APR)
- Simple Interest
- Compound interest
- Continuous compounding
- Effective Annual Yield (or Effective Rate)
- Return (on investment)
- Annuity
- Value of Annuity
- Stocks
- Shares/Shareholder
- Dividends
- Installment Loan
- Fixed Rate
- Variable Rate
- Leasing (cars)
- Mortgage
- Down Payment
- Points (related to morgages)
- Loan Amortization Schedule
- Equity
- Revolving Credit
- Average Daily Balance

Chapter 10
- Line, ray, line segment
- Complimentary, Supplementary angles
- Vertical angles
- Angles created by parallel lines cut by a transversal
- Triangle angle sum
- Classifications of Triangles (by angles and by sides)
- Similar triangles
- Pythagorean Theorem
- Circumference, radius, diameter

Chapter 1

1. Apples normally sell for $0.32 each. They go on sale for 3 for $0.69. How much money is saved if you purchase 2 dozen apples while they are on sale?

Not on sale : $(0.32)(24) = 7.68$

On sale:

$\frac{24}{3} = 8(0.69) = 5.52 \longrightarrow$

$\begin{array}{r} 7.68 \\ -5.52 \\ \hline 2.16 \end{array}$

$2.16 saved

2. What is Polya's four-step problem-solving approach? What are some of the strategies suggested that might help you solve a problem when you're "stuck"?

a)
1. understand the problem
2. Make a plan
3. Carry out the plan
4. Look back & check

b)
- draw a picture
- make a table
- look for a pattern
- make it an easier problem
- (others)

3. According to the U.S. Census Bureau, in 2012, there were 229,937,770 Americans 20 years and older. Assuming the circle graph is representative of this age group,

a. Use the appropriate information displayed by the graph to determine a calculation that shows the number of Americans 20 years and older who define old age by a decline in physical ability.

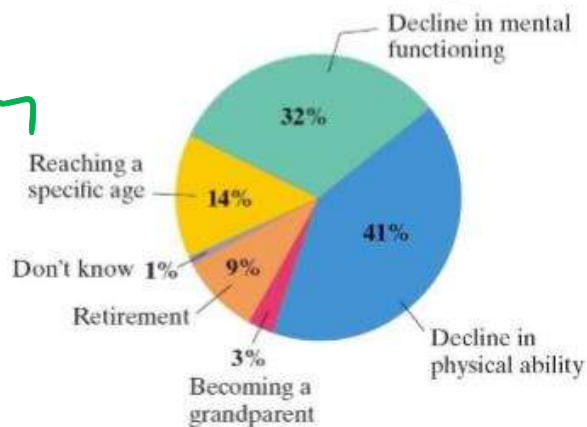41% of $229,937,770 = 94274485.7$

b. How many Americans 20 years and older define old age by retirement or by reaching a specific age? Give both the percentage and the number estimated to the hundredths place.

retirement = 9%
Sp. age = 14% ⟩ total = 23%

$(0.23)(229,937,770) = 52885687.1$

52885687

Americans' Definition of Old Age

- Decline in mental functioning — 32%
- Decline in physical ability — 41%
- Reaching a specific age — 14%
- Don't know 1%
- Retirement 9%
- Becoming a grandparent 3%

4. Find the prime factorization of 120 and 252. Then,
   a. Find the least common multiple of the two numbers
   b. Find the greatest common divisor of the two numbers

a) LCM: $2^3 \cdot 3^2 \cdot 5 \cdot 7$
   $= 2520$

b) GCD $= 2^2 \cdot 3$
   $= 12$

120
$\times$
$12 \cdot 10$
$4 \cdot 3 \cdot 2 \cdot 5$
$2 \cdot 2$
$2^3 \cdot 3 \cdot 5$

252
$\wedge$
$2 \cdot 126$
$6 \cdot 21$
$2 \cdot 3 \quad 3 \cdot 7$
$2^2 \cdot 3^2 \cdot 7$

5. Planets A, B, and C orbit a certain star every 2, 7, and 10 months, respectively. If the three planets are now in a straight line, what is the smallest number of months that must pass before they line up again?

2   7 $2 \cdot 5$

LCM: $2 \cdot 5 \cdot 7 = $ 70 months

6. Write the following using Scientific Notation:
   a. 16,810,000

   1.681×10^7

   b. 0.0000932

   9.32×10^{-5}

7. Write each of the values below in decimal or standard notation.
   a. 7.35×10^{-4}

   0.000735

   b. 6.108×10^9

   6,108,000,000

8. Perform the following operations leaving in scientific notation to do so.

   a. Multiply $(1.5 \times 10^{-7})(4.2 \times 10^{12})$.

   $(1.5)(4.2) \times (10^{-7})(10^{12})$
   6.3×10^5

   b. Divide $\dfrac{16.4 \times 10^{-9}}{4 \times 10^{-4}}$

   $\dfrac{16.4}{4} \times 10^{-9-(-4)}$
   4.1×10^{-5}

9. Company A pays $53,000 yearly with raises of $1600 per year. The yearly pay for each year can be expressed as terms of an arithmetic sequence.

   a. Write out the annual pay for the first three years of employment.

   $a_1 = \$53,000$
   $a_2 = 53,000 + 1600 = \$54,600$
   $a_3 = 54,600 + 1600 = \$56,200$

   b. Write a simplified equation (or "rule") for the nth term of this sequence.

   $a_n = a_1 + d(n-1)$
   $= 53,000 + 1600(n-1)$
   $= 53,000 + 1600n - 1600$

   $\rightarrow a_n = 51,400 + 1600n$

c. If you retired from Company A after working there for 25 years, what would your pay be in your final year? Use your answer from part (b) to find it.

$a_{25} = 51,400 + 1600(25)$ $\longrightarrow$ **$\$91,400$**
$= 51,400 + 40,000$

d. If Company B pays $56,000 yearly with raises of $1200 each year, which company will pay more in year 10? How much more?

A: $a_{10} = 51,400 + 1600(10)$
$= 51,400 + 16,000$
$= \$67,400$

B: $a_{10} = 56000 + 1200(10-1)$
$= 56,000 + 10,800$
$= \$66,800$

A pays 600 more in year 10.

10. A professional baseball player signs a contract with a beginning salary of $3,000,000 for the first year with an annual increase of 4% per year beginning in the second year. That is, beginning in year 2, the athlete's salary will be 1.04 times what it was in the previous year. The yearly pay for each year can be expressed as terms of a geometric sequence.

a. Write out the pay for the first three years of the contract.

$a_1 = \$3,000,000$
$a_2 = 3,000,000(1.04) = \$3,120,000$
$a_3 = 3,120,000(1.04) = \$3,244,800$

b. Write a simplified equation (or "rule") for the nth term of this sequence.

$a_n = 3,000,000(1.04)^{n-1}$

c. Use your answer from part (b) to determine the athlete's salary for year 7 of the contract. Round to the nearest dollar.

$a_7 = 3,000,000(1.04)^6$
$= \$3,795,957$

11. Find the value of each expression. You should do these without a calculator as you will be asked to show your steps for full credit on your exam.

a. $30 \div \left[5^2 \div (7-12)\right] - (-9)$

$30 \div \left[5^2 \div (-5)\right] + 9$
$30 \div \left[25 \div (-5)\right] + 9$
$30 \div (-5) + 9$
$-6 + 9$
3
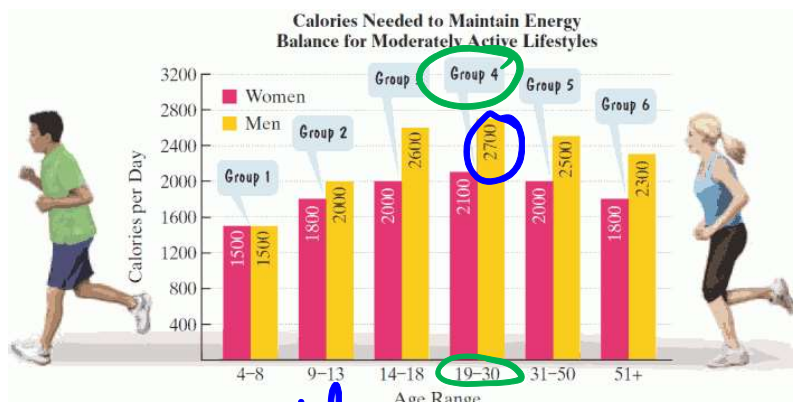
b. $8^2 - 16 \div 2^2 \cdot 4 - 3$

$64 - 16 \div 4 \cdot 4 - 3$
$64 - 4 \cdot 4 - 3$
$64 - 16 - 3$
$48 - 3$
45

12. The bar graph shows the estimated number of calories per day needed to maintain energy balance for various gender and age groups for moderately active lifestyles.

The mathematical model $M = -96x^2 + 802x + 660$ describes the number of calories needed per day by men in age group x with moderately active lifestyles.

a. According to the model, how many calories per day are needed by men between the ages of 19 and 30, inclusive, with this lifestyle?

b. Does this overestimate or underestimate the number shown by the graph? By how much?

Calories Needed to Maintain Energy Balance for Moderately Active Lifestyles

Women
Men

Age Range	Women	Men
4–8 (Group 1)	1500	1500
9–13 (Group 2)	1800	2000
14–18 (Group 3)	2000	2600
19–30 (Group 4)	2100	2700
31–50 (Group 5)	2000	2500
51+ (Group 6)	1800	2300

a) $x = 4$

$M = -96(4)^2 + 802(4) + 660$

$= -1536 + 3208 + 660$

$M = 2332$

b) model underestimates the value shown in the graph by 368 calories.

13. To estimate the number of bass in a lake, wildlife biologists tagged 50 bass and release them in the lake. Later they netted 108 bass and found that 27 of them were tagged. Approximately how many bass are in the lake?

$x = \#$ in lake

$\dfrac{27}{108} = \dfrac{50}{x}$

$5400 = 27x$

$x = \boxed{200\ bass}$

14. A discount pass for a bridge costs \$30.00 per month. The toll for the bridge is normally \$5.00, but it is reduced to \$3.50 for people who have purchased the discount pass. Determine the number of times in a month the bridge must be crossed so that the total monthly cost without the discount pass is the same as the total monthly cost with the discount pass.

$x = \#$ of bridge crossings

without pass   with pass

$5x$ $=$ $3.50x + 30$

$-3.50x$ $-3.50x$

$\dfrac{1.5x}{1.5} = \dfrac{30}{1.5}$

$x = 20$

If you cross 20 times the cost is the same. If over 20, the pass saves you money.

15. An elevator at a construction site has a maximum capacity of 2800 pounds. If the elevator operator weighs 265 pounds and each cement bag weighs 65 pounds, up to how many bags of cement can be safely lifted on the elevator in one trip?

$$\begin{array}{r}2800 \\ -\ 265 \\ \hline 2535\end{array}$$ capacity operator new capacity

$$\frac{2535}{65} = 39$$

39 bags of cement

16. Solve the quadratic equation algebraically: $x^2 + 9x = -8$

Solve by factoring:

$x^2 + 9x + 8 = 0$

$(x+1)(x+8) = 0$

$x+1 = 0 \qquad x+8 = 0$

$x = -1 \qquad x = -8$

use Quadratic formula $a = 1$, $b = 9$, $c = 8$

$x = \dfrac{-9 \pm \sqrt{9^2 - 4(1)(8)}}{2(1)}$

$= \dfrac{-9 \pm \sqrt{81-32}}{2}$

$= \dfrac{-9 \pm \sqrt{49}}{2} = \dfrac{-9 \pm 7}{2}$

$\to \dfrac{-9+7}{2} = \boxed{-1}$

$\to \dfrac{-9-7}{2} = \boxed{-8}$

17. The percentage, p, of the United States population that was foreign-born x years after 1920 can be modeled by the formula $p = 0.004x^2 - 0.36x + 14$. Use the formula for the following questions.

a. According to the model, what percentage of U.S. population was foreign-born in 1990? $x = 70$

$P = 0.004(70)^2 - 0.36(70) + 14$

$= 19.6 - 25.2 + 14$

$= \boxed{8.4\%}$

b. If trends shown by the model continue, in which year will 23% of the U.S. population be foreign-born? Round to the nearest year.

$23 = 0.004x^2 - 0.36x + 14$

$-23 \qquad\qquad\qquad\qquad -23$

$0 = \boxed{0.004}x^2 \boxed{-0.36}x \boxed{-9}$

$\quad\ \ a \qquad\quad b \qquad\ c$

$x = \dfrac{-(-0.36) \pm \sqrt{(0.36)^2 - 4(0.004)(-9)}}{2(0.004)}$

$x = \dfrac{0.36 \pm \sqrt{0.1296 + 0.144}}{0.008}$

$x = \dfrac{0.36 \pm \sqrt{0.2736}}{0.008} = \dfrac{0.36 \pm 0.5231}{0.008}$

$= \boxed{110.38}$

1920
$+110.38$
$\overline{2030.38}$

During 2030

or -20.38 this is before 1920

18. Evaluate the algebraic expression for the given values of the variables.

$x^2 - 3xy + 4y^2; \quad x = -1, \ y = -2$

$(-1)^2 - 3(-1)(-2) + 4(-2)^2$

$1 - 6 + 16$

$-5 + 16 = \boxed{11}$

19. Find the equation of the line that goes through the points $(-3, 5)$ and $(2, 4)$. Write your answer in either standard $Ax + By = C$ form <u>or</u> slope intercept $y = mx + b$ form.

slope: $\dfrac{4-5}{2-(-3)} = \dfrac{-1}{5}$

$y = -\dfrac{1}{5}x + \dfrac{22}{5}$

$4 = -\dfrac{1}{5}(2) + b$

$4 = -\dfrac{2}{5} + b$

$\dfrac{20}{5} = \dfrac{2}{5} + b$

$b = \dfrac{22}{5}$

20. **Use a Linear Equation to Solve.** A streaming movie service charges $12 per month for access and $3 per movie. Write an equation that gives the cost (y), for monthly charge for a household that streams x movies per month.

$y = 12 + 3x$

How much would one have to pay for a month when 17 movies were watched?

$y = 12 + 3(17)$
$y = 12 + 51$

$\$63$

21. Basketball tickets at a high school sell for $5 for adults and $2 for students. They made $900 in sales for one game and a total of 270 tickets were sold. How many of each type of ticket were sold?

$x = $ # of adults
$y = $ # of students
Substitution:
$5x + 2(270 - y) = 900$
$5x + 540 - 2x = 900$

$x + y = 270 \Rightarrow y = 270 - x$
$5x + 2y = 900$

$3x = 360$
$x = 120$
$y = 150$

(can also use addition to solve)
[See next page]

120 adults
150 students

22. Whether on the slopes or at the shore, people are exposed to harmful amounts of the sun's skin-damaging ultraviolet (UV) rays. The quadratic function $D(x) = 0.8x^2 - 17x + 109$ models the average time in which skin damage begins, $D(x)$, where x is the amount of UV index, or measure of the sun's UV intensity. The graph of D is shown for the UV index from 1(low) to 11 (high).

Average Time in Which Skin Damage Begins at Various UV Exposures

$D(x) = 0.8x^2 - 17x + 109$

Minutes to Skin Damage

UV Index

Low   High
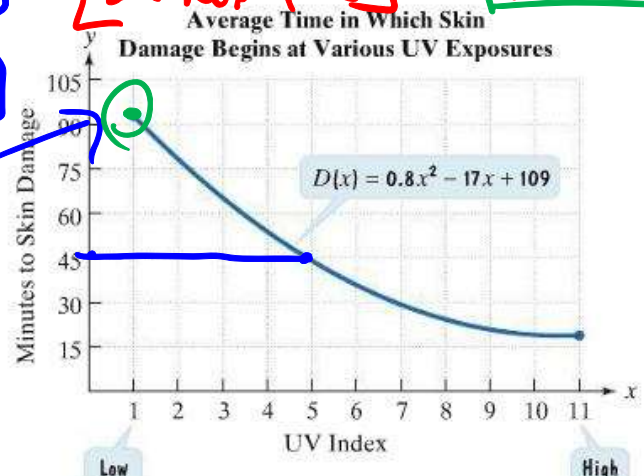
Source: National Oceanic and Atmospheric Administration

a. Find and interpret $D(1)$. How is this shown on the graph of D?

$x = 1$ $y \approx 93$ | on graph

when UV index is 1, it takes about 93 min. for skin damage to occur.

b. What is the index for a person to reach skin damage at 45 minutes?

UV index of 5 for 45 min   (by looking at graph)

[See next page to use model to answer #22]

#21 Alternate method:

$-2(x + y = 270)$

$5x + 2y = 900$

$-2x - 2y = -540$

$\overline{3x \qquad = 360}$

$x = 120$

$120 + y = 270$

$y = 150$

#22a using model

$D(1) = 0.8(1)^2 - 17(1) + 109$

$= 0.8 - 17 + 109$

$= \boxed{92.8 \text{ min}}$

#22b

$45 = 0.8x^2 - 17x + 109$

$-45 \qquad\qquad\qquad -45$

$0 = 0.8x^2 - 17x + 64$

$x = \dfrac{-(-17) \pm \sqrt{(-17)^2 - 4(0.8)(64)}}{2(0.8)}$

$= \dfrac{17 \pm \sqrt{289 - 204.8}}{1.6}$

$= \dfrac{17 \pm \sqrt{84.2}}{1.6} = \dfrac{17 \pm 9.176}{1.6}$

$= 16.4 \text{ or } \boxed{4.9}$

our range only goes up to 11
so answer can't be 16.4

23. Suppose that the luxury sales tax rate in a foreign country is 29%. A very wealthy socialite bought a diamond tiara for $185,000. How much tax does she pay?

$$29\% \text{ of } 185,000 = 0.29(185000)$$
$$\$53,650 \text{ tax}$$

24. Suppose that you invest $5000 in a risky investment. At the end of the first year, the investment has decreased by 70% of its original value. At the end of the second year, the investment increases by 80% of the value it had at the end of the first year. Your investment consultant tells you that there must have been a 10% overall increase of the original $5000 investment. Is this an accurate statement? If not, what is your actual percent gain or loss on the original $5000 investment? Round to the nearest percent.

1$\underline{st}$ year ↓ 70%, so 30% left: 0.3(5000) = 1500

2$\underline{nd}$ year ↑ 80%, so 180% of 1500: 1.8(1500) = 2700

70% ↓ + 80% ↑ ≠ 10% increase   percent change:

$$\frac{2700 - 5000}{5000} = \frac{-2300}{5000} = \boxed{46\% \text{ decrease}}$$

25. A mother invests $9000 in a bank account at the time of her daughter's birth. The interest is compounded quarterly at a rate of 7%. What will be the value of the daughter's account on her twentieth birthday, assuming no other deposits or withdrawals are made during this period?

$$A = 9000\left(1 + \frac{.07}{4}\right)^{20(4)}$$
$$= 9000(1.0175)^{80}$$

$$\boxed{\$36,057.53}$$

26. Suppose your credit card has a balance of $2500 and an annual interest rate of 19%. You decide to pay off the balance over three years. If there are no further purchases charged to the card, (a) How much must you pay each month? (b) How much total interest will you pay?

a)
$$PMT = \frac{2500\left(\frac{.19}{12}\right)}{\left[1 - \left(1 + \frac{.19}{12}\right)^{-12(3)}\right]} = \$91.64$$

b) 91.64(36) = 3299.04   total paid
$$ - 2500 \qquad \text{owed}$$
$$\boxed{\$799.04} \qquad \text{Interest}$$

27. Suppose that between the ages of 23 and 45, you contribute $3000 per year to a 401(k) and your employer contributes $1500 per year on your behalf. The interest rate is 8.1% compounded annually. What is the value of the 401(k), rounded to the nearest **cent** , after 22 years?

$$\frac{4500\left[\left(1 + \frac{.081}{1}\right)^{1(22)} - 1\right]}{\frac{.081}{1}} = \$252,687.12$$

28. Suppose that you borrow $15,000 for a new car. You can select one of the following loans, each requiring regular monthly payments:

Installment *Loan A:* three-year loan at 5.9% OR Installment *Loan B:* five-year loan at 6.9%.

Find the monthly payments and the total interest for both Loan A and Loan B. Compare the monthly payments and the total interest over the life of each loan.

(A)

$$PMT = \frac{15000\left(\frac{.059}{12}\right)}{\left[1-\left(1+\frac{.059}{12}\right)^{-12(3)}\right]}$$

$$= \frac{73.75}{0.16185678892}$$

$$= \boxed{\$455.65}$$ monthly

Total
455.65 (36)
16403.40
−15000
$\boxed{\$1463.40}$ Total Interest

(B)

$$PMT = \frac{15,000\left(\frac{.069}{12}\right)}{\left[1-\left(1+\frac{.069}{12}\right)^{-12(5)}\right]}$$

$$= \frac{86.25}{0.2910795159}$$

$$= \boxed{\$296.31}$$ monthly

Total
296.31 (60)
17,778.60
−15000
$\boxed{\$2778.60}$ Total Interest

Chapter 10

33. Use similar triangles and the fact that corresponding sides are proportional to find the length of the segment marked with an x.

9 in.
8 in.
x   9 in.
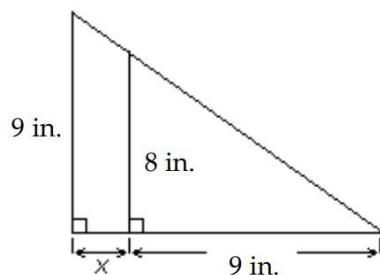
$$\frac{9}{9+x} = \frac{8}{9}$$

$$8(9+x) = 81$$
$$72 + 8x = 81$$
$$8x = 9$$
$$\boxed{x = \frac{9}{8} \text{ in}}$$

34. Find the measures of the angles indicated.

A
B   12° C

A. **78°**

B. **90°**
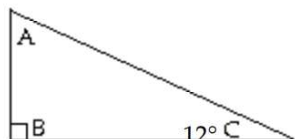
70°
5   3 2
4   1
30°
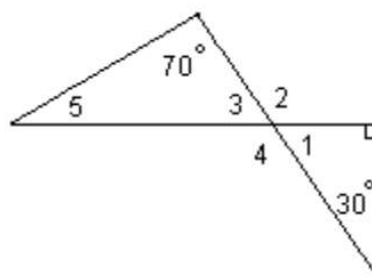
1. **60°**
2. **120°**
3. **60°**

4. **120°**
5. **50°**

35. Find the measures of the angles indicated.

a.

4 | 57° | 1
3 | | 2

1. __33°__
2. __90°__
3. __33°__
4. __90°__

b.

ℓ∥m

6 | 7
5 | 23°

4 | 1
3 | 2

ℓ

m

1. __157°__   5. __157°__
2. __23°__   6. __23°__
3. __157°__   7. __157°__
4. __23°__

c.

C (x+7)°

B (3x+8)°   A x°
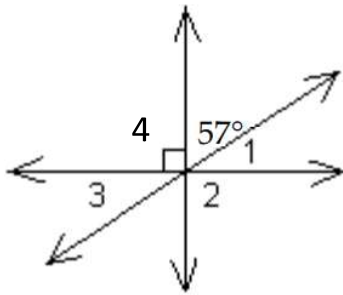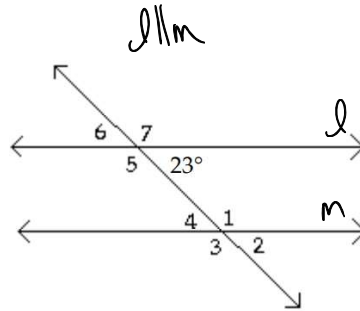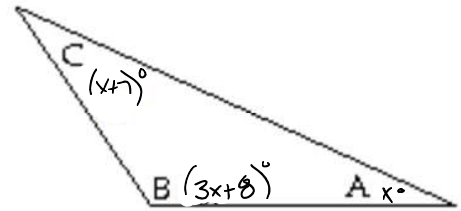
A. __33°__
B. __107°__
C. __40°__

$(x+7) + (3x+8) + x = 180$
$5x + 15 = 180$; $5x = 165$; $x = 33$

36. Find the missing length in the right triangle. Use a calculator to find square roots, rounding, if necessary, to the nearest tenth.

a.

c
14 cm
20 cm
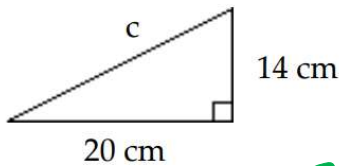
$14^2 + 20^2 = c^2$
$196 + 400 = c^2$
$\sqrt{596} = \sqrt{c^2}$ $c \approx 24.4 cm$

b.

15 cm   25 cm

b
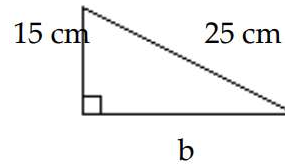
$15^2 + b^2 = 25^2$
$225 + b^2 = 625$
$\sqrt{b^2} = \sqrt{400}$
$b = 20 cm$

36. Use formulas to find the area of the figures.

a.

7 cm
8 cm

$A = \ell \cdot w$
$= 7 \cdot 8$
$= 56 cm^2$

b.

13 cm
5 cm
17 cm
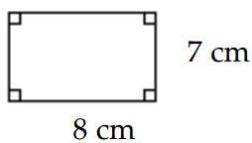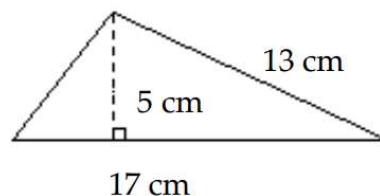
$A = \frac{1}{2} bh$
$= \frac{1}{2} \cdot 17 \cdot 5$
$= 42.5 cm^2$

c.

9 m
16.3 m
19 m
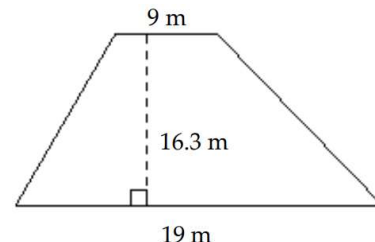
$A = \frac{1}{2}(b_1 + b_2) h$
$= \frac{1}{2}(9 + 19) 16.3$
$= 228.2 m^2$

37. Use formulas to find the area of the figures. Round to hundredths.
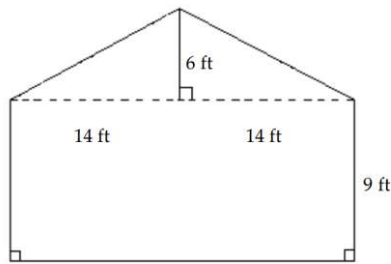
a.

6 ft

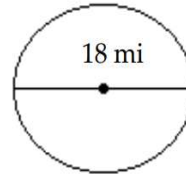14 ft   14 ft

9 ft

$\triangle = \frac{1}{2}(28)(6) = 84$

$\square = 9(28) = 252$

336 ft^2
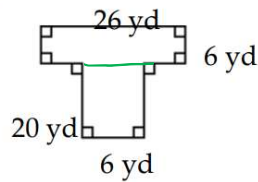
b.

26 yd

6 yd

20 yd

6 yd

$\square = 6(26) = 156$

$\square = 20 \cdot 6 = 120$

276 yd^2

c.

18 mi

$A = \pi r^2$
$= \pi (9)^2$
$= 81 \pi$
$\approx 254.47 \text{ mi}^2$

d.

20 mi
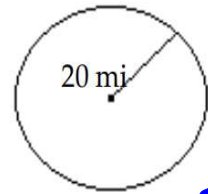
$A = \pi (20)^2$
$= 400 \pi$
$\approx 1256.64 \text{ mi}^2$

38. The rectangular front of a house measures 17 feet by 25 feet. A rectangular door on the side of the house measures 7 feet by 3 feet. There are also 9 rectangular windows on the front of the house, each measuring 2 feet by 3 feet. How many square feet of siding will be needed to cover the front of the house not counting the area covered by the door and windows? (Hint: draw a picture!)
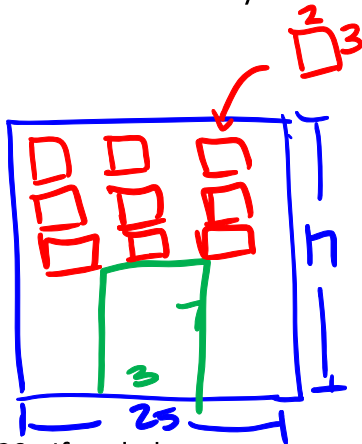
$A = 17(25) - (3 \cdot 7 + 9(2 \cdot 3))$
$= 425 - (21 + 54)$
$= 425 - 75$
$= 350 \text{ ft}^2$

39. If asphalt pavement costs $0.70 per square foot, find the cost to pave the circular path (indicated by dots) in the figure shown.

60 ft
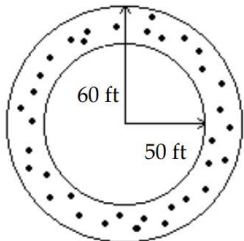
50 ft

Large circle: $A = \pi (60)^2 = 3600 \pi$
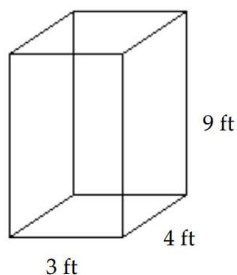Small circle: $A = \pi (50)^2 = 2500 \pi$

$3600 \pi - 2500 \pi = 1100 \pi \text{ ft}^2$

$1100 \pi (0.70) = \$2419.03$

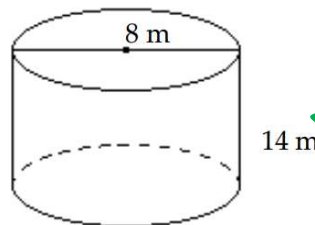40. Find the surface area and volume of the figures. Round to hundredths.

$2(circle) +$ ▭

a.

9 ft
4 ft
3 ft

$SA = 3 \cdot 4 \cdot 2 = 24$
$4 \cdot 9 \cdot 2 = 72$
$3 \cdot 9 \cdot 2 = 54$

$SA = \boxed{150 \, ft^2}$

$V = B \cdot h$
$= (l \cdot w) \cdot h$
$= 3 \cdot 4 \cdot 9$
$\boxed{V = 108 \, ft^3}$

b.

8 m
14 m

$SA = 2\pi r^2 + 2\pi r h$
$= 2\pi(4)^2 + 2\pi 4 \cdot 14$
$= 32\pi + 112\pi$
$= 144\pi$
$SA \approx \boxed{452.39 \, m^2}$

$V = Bh$
$= \pi r^2 h$
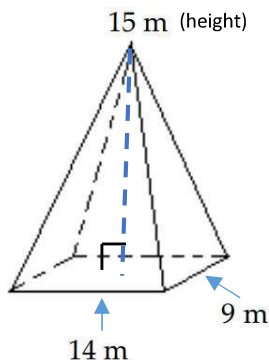$= \pi 4^2 \cdot 14$
$V = 224\pi \approx \boxed{703.72 \, m^3}$

41. Find the volume of the figures. Round to hundredths.

a.

10 ft
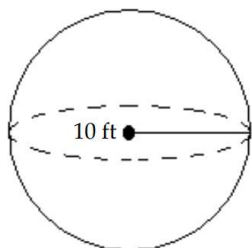
$V = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi (10)^3$
$= \frac{4000}{3}\pi$
$\boxed{V \approx 4188.79 \, ft^3}$

b.

15 m (height)
F
9 m
14 m

$V = \frac{1}{3}Bh$
$= \frac{1}{3}(l \cdot w)h$
$= \frac{1}{3}(14 \cdot 9)15$
$\boxed{V = 630 \, m^3}$

c.

5 in.
4 in.
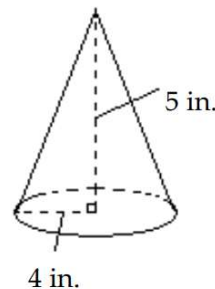
$V = \frac{1}{3}Bh$
$= \frac{1}{3}(\pi r^2)h$
$= \frac{1}{3}\pi(4)^2 \cdot 5$
$\boxed{V = 83.78 \, in^3}$

42. A new pyramid found in South America has a rectangular base that measures 75 yd by 180 yd, and has a height of 90 yd. The pyramid is not hollow like the Egyptian pyramids and is composed of layer after layer of cut stone. The stone weighs 456 pounds per cubic yard. How many pounds does the pyramid weigh?
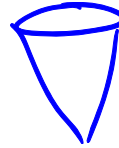
90
180
75
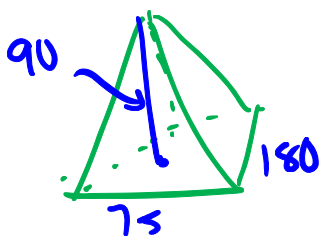
$V = \frac{1}{3}Bh$
$= \frac{1}{3}(75)(180)(90)$
$= 405,000 \, yd^3$

$\times 456$

$\boxed{184,680,000 \text{ pounds}}$

43. Find the volume of the entire ice cream cone if the ice cream is *half* of a sphere. Give an exact answer (in terms of π) and an approximate answer rounded to hundredths.
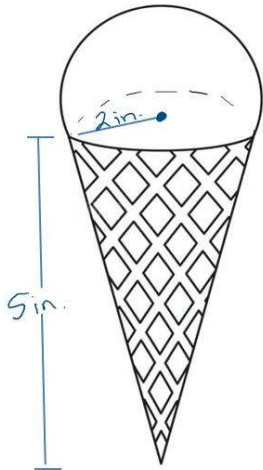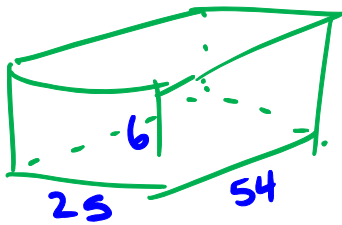
$$V = \frac{1}{2}\left(\frac{4}{3}\pi r^3\right)$$
$$= \frac{2}{3}\pi \cdot 2^3$$
$$= \frac{16}{3}\pi$$

$$V = \frac{1}{3}Bh$$
$$= \frac{1}{3}\pi r^2 h$$
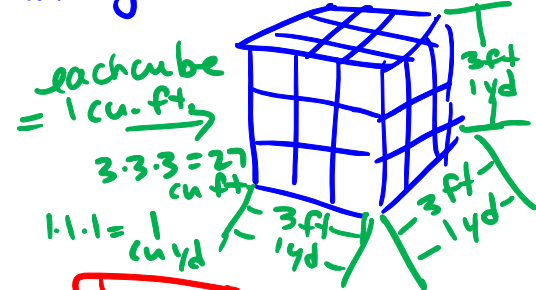$$= \frac{1}{3}\pi \cdot 2^2 \cdot 5$$
$$= \frac{20}{3}\pi$$

$$V = \frac{16}{3}\pi + \frac{20}{3}\pi = \frac{36}{3}\pi = 12\pi \approx \boxed{37.70 \text{ in}^3}$$

44. A building contractor is to dig a foundation 54 feet long, 25 feet wide, and 6 feet deep. The contractor pays $15 per load for trucks to remove the dirt. Each truckload holds 5 cubic yards. What is the cost to the contractor to have all the dirt hauled away?

$$V = Bh$$
$$= \ell \cdot w \cdot h$$
$$= 54 \cdot 25 \cdot 6$$
$$= 8100 \text{ ft}^3$$

$$\frac{8100}{27} = 300 \text{ cu yards} \quad \text{same}$$

$$\frac{300}{5} \quad 60 \text{ loads} \times \$15 = \boxed{\$900}$$

1 cubic yard = 27 cubic feet

each cube = 1 cu. ft

$3 \cdot 3 \cdot 3 = 27$ cu ft

$1 \cdot 1 \cdot 1 = 1$ cu yd

3 ft — 1 yd
3 ft — 1 yd
3 ft — 1 yd

Chapter 11

29. Next semester, you are planning to take three courses – math, English and humanities. There are 8 sections of math, 5 of English, and 4 of humanities that you find suitable. Assuming no scheduling conflicts, how many different three-course schedules are possible?

$$8 \cdot 5 \cdot 4 = 160 \text{ different schedules}$$

30. You and 19 of your friends have decided to form a business. The group needs to choose three officers– a CEO, an operating manager, and a treasurer. In how many ways can those offices be filled?

$$20 \cdot 19 \cdot 18 \cdot = 6840 \text{ ways}$$

31. Two dice are rolled. What is the probability of getting a sum of 5?

ways to get a 5

possible outcomes

$$\frac{4}{6 \cdot 6} = \frac{4}{36} = \boxed{\frac{1}{9}}$$

1 4
2 3
3 2
4 1

32. One day at a dog park, during a one-hour period, you noted the kinds of dogs that were there. The data is in the table below.
   a. What is the probability that a randomly chosen dog at the dog park would be a beagle?
   b. What is the probability it would not be a Labrador Retriever?
   c. If throughout the day 300 dogs visit the dog park, how many of them would you expect to be mixed breed dogs based on your observations?

Kind of Dog	# present
Chihuahua	6
Labrador Retriever	20
Beagle	8
German Shepherd	4
Mixed Breed	12

$n = 50$

a) $\frac{8}{50} = \frac{4}{25} = 0.16$

b) $\frac{30}{50} = \frac{3}{5} = 0.6$

c) $\frac{12}{50} = \frac{x}{300}$ $50x = 3600$ $\boxed{x = 72}$

Chapter 12

33. Construct a frequency distribution for the data of the age of maximum yearly growth for 35 boys:

12, 14, 13, 14, 16, 14, 14, 17, 13, 10, 13, 15, 12, 15, 14, 16, 15, 14, 14, 13, 15, 16, 15, 12, 13, 16, 11, 15, 12, 13, 12, 11, 13, 14, 14.

   a. Find the median.
   b. Find the mode.
   c. Find the mean.
   d. Find the midrange

Age	freq		X·f
10	I	1	10
11	II	2	22
12	IIII	5	60
13	IIIII II	7	91
14	IIIII IIII	9	126
15	IIIII I	6	90
16	III	3	48
17	I	1	17
18	I	1	18

n = 35   Total: 482

d) $\frac{10 + 18}{2} = 14$

a) $\frac{n+1}{2} = \frac{35+1}{2} = \frac{36}{2} = 18$
18th datapoint $\boxed{14}$

b) $\boxed{14}$ is mode

c) $\frac{482}{35} = \boxed{13.77}$

34. True or False?   If false, what would the correct statement be?

In a normal distribution, the median is less than the mean and is located to the left of the mean on the graph of the distribution.   F - In a normal distribution, the mean, median, and mode are all equal.

35. In a normal distribution, approximately what percent of data items fall within 1 standard deviation of the mean (in both directions)?   68% is within 1 standard deviation (34% on each side)