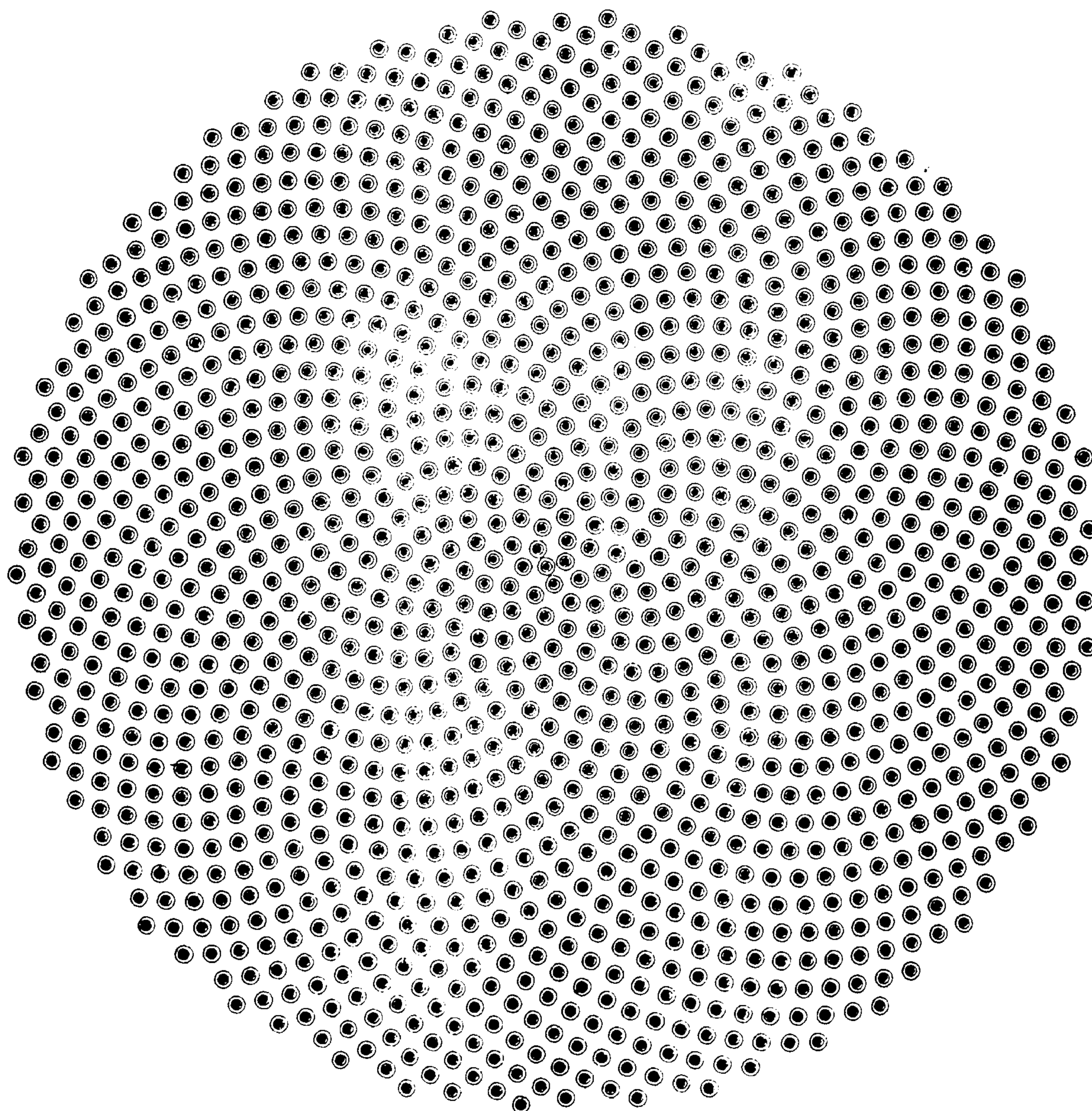


Pre-Calculus Algebra

MTH 1112

Practice Test 2



Practice Test 2

This practice test will cover:

- * Equations with fractions
- * Literal equations and word problems
- * Quadratic equations
(factoring, completing the square, quadratic formula)
- * Inequalities
(linear, quadratic, rational)
- * Absolute value equations and inequalities

Equations with fractions

(1) Solve the equation for X .

$$\frac{5X}{4} + \frac{1}{2} = X - \frac{1}{2}$$

(2) Solve the equation for X .

$$\frac{X}{5} - \frac{X}{2} = 3$$

(3) Solve the equation for Z .

$$\frac{3}{2}(Z + 5) - \frac{1}{4}(Z + 24) = 0$$

(4) Solve the equation for X .

$$\frac{3X}{2} + \frac{1}{4}(X - 2) = 10$$

(5) Solve the equation for U .

$$\frac{100 - 4U}{3} = \frac{5U + 6}{4} + 6$$

(6) Solve the equation for Y .

$$\frac{17 + Y}{Y} + \frac{32 + Y}{Y} = 100$$

(7) Solve the equation for X .

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

(8) Solve the equation for X .

$$10 - \frac{13}{X} = 4 + \frac{5}{X}$$

(9) Solve the equation for X .

$$\frac{1}{X} + \frac{1}{4} = \frac{1}{5}$$

(10) Solve the equation for X .

$$\frac{X}{X + 4} + \frac{4}{X + 4} + 2 = 0$$

(11) Solve the equation for X .

$$\frac{1}{X} + \frac{2}{X - 5} = 0$$

(12) Solve the equation for Z .

$$3 = 2 + \frac{2}{Z + 2}$$

(13) Solve the equation for X .

$$\frac{2}{(X-4)(X-2)} = \frac{1}{X-4}$$

(14) Solve the equation for X .

$$\frac{15}{X} - 4 = \frac{6}{X} + 3$$

(15) Solve the equation for T .

$$3\left(1 - \frac{1}{5T}\right) = 0$$

Literal Equations

(16) Solve $d = rt$ for r .

(17) Solve $P = \frac{144M}{Y}$ for M .

(18) Solve $P = a + b + c$ for b .

(19) Solve $T = m - n$ for n .

(20) Solve $V = lwn$ for w .

(21) Solve $A = \pi r^2$ for π .

(22) Solve $A = \frac{1}{2}h(B + b)$ for h .

(23) Solve $W = Fd$ for F .

(24) Solve $Y - Y_1 = m(X - X_1)$ for m .

(25) Solve $C = \frac{100w}{L}$ for w .

(26) Solve $I = \frac{100M}{C}$ for C .

(27) Solve $\frac{1}{a} + \frac{1}{b} = \frac{1}{c}$ for b

(28) Solve $mb - 2 = ma$ for m .

(29) Solve $\frac{2}{3}(X + Y) = \frac{1}{3}d$ for Y .

(30) Solve $at + bt + ct = k$ for t .

Quadratic Equations

(31) Solve.

$$(X - 1)(X + 3) = 0$$

(32) Solve.

$$d(d - 5) = 0$$

(33) Solve.

$$m(m + 7)(2m - 1) = 0$$

(34) Solve.

$$(2a - 3)(5a + 6) = 0$$

(35) Solve by factoring.

$$6X^2 + 3X = 0$$

(36) Solve by factoring.

$$9X^2 - 1 = 0$$

(37) Solve by factoring.

$$X^2 - 2X - 8 = 0$$

(38) Solve by factoring.

$$X^2 - 10X + 9 = 0$$

(39) Solve by factoring.

$$-X^2 + 8X = 12$$

(40) Solve by factoring.

$$3 + 5X - 2X^2 = 0$$

(41) Solve by factoring.

$$x^2 + 2ax + a^2 = 0$$

(42) Solve by factoring.

$$(x + a)^2 - b^2 = 0$$

(43) Solve by factoring.

$$16X^2 + 56X + 49 = 0$$

(44) Solve by factoring.

$$2X^2 = 19X + 33$$

(45) Solve by factoring.

$$r(r + 7) = 8$$

(46) Solve by factoring.

$$3p^2 - 6p = 2p^2 - 4p - 1$$

(47) Solve by factoring.

$$10 - 2Y = (Y - 5)^2$$

(48) Solve by factoring.

$$(X + 1)(X - 2) = 4$$

(49) Solve by extracting square roots.

$$X^2 = 16$$

(50) Solve by extracting square roots.

$$X^2 = 7$$

(51) Solve by extracting square roots.

$$3X^2 = 36$$

(52) Solve by extracting square roots.

$$(X - 5)^2 = 20$$

(53) Solve by extracting square roots.

$$(X + 13)^2 = 21$$

(54) Solve by extracting square roots.

$$(X - 7)^2 = (X + 3)^2$$

(55) Given $X^2 + 10X + \boxed{?}$. What would have to be filled in for the question mark to make a perfect square trinomial?

(56) Solve by using the quadratic formula.

$$X^2 + 3X = 9$$

(57) Solve by using the quadratic formula.

$$8X^2 - 24X + 18 = 0$$

(58) Solve by using the quadratic formula.

$$2X^2 + X - 1 = 0$$

(59) Solve by using the quadratic formula.

$$(Y - 5)^2 = 2Y$$

(60) Solve by using the quadratic formula.

$$16X^2 + 8X - 3 = 0$$

(61) Solve by using the quadratic formula.

$$28X - 49X^2 = 4$$

(62) Solve by using the quadratic formula.

$$4X^2 + 4X = 7$$

(63) Solve by using the quadratic formula.

$$2 + 2X - X^2 = 0$$

(64) Solve by using the quadratic formula.

$$9X^2 + 24X + 16 = 0$$

(65) Solve.

$$3(2a^2 + 1) = 7a^2 - a - 27$$

(66) Solve.

$$X^3 - 2X^2 = 8X$$

(67) Solve.

$$5X(12X^2 + 7X + 1) = 0$$

(68) Solve.

$$(p^2 - 2p - 15)(p^2 + 4p - 12) = 0$$

Inequalities

(69) Solve the linear inequality and sketch the graph of the solution set.

$$5X - 7 > 3X + 9$$

(70) Solve the linear inequality and sketch the graph of its solution set.

$$1 - \frac{3X}{2} \geq X - 4$$

- (71) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$2X > 3$$

- (72) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$4 - 2X < 3$$

- (73) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$6X - 4 \leq 2$$

- (74) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$2 - Y \geq -6$$

- (75) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$1 < 2X + 3 < 9$$

- (76) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$-8 \leq 1 - 3(X - 2) < 13$$

- (77) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$-3 \leq 6X - 1 \leq 3$$

- (78) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$-4 < \frac{2X - 3}{3} < 4$$

- (79) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$0 \leq \frac{X + 3}{2} \leq 5$$

- (80) Solve the linear inequality and sketch the graph of its solution set.
Also, give your answer in interval notation.

$$-1 < -\frac{X}{3} < 1$$

- (81) Solve the quadratic inequality. Write the solution in interval notation.
Graph each solution.

$$(X + 2)(X - 3) < 0$$

- (82) Solve the quadratic inequality. Write the solution in interval notation.
Graph the solution.

$$X^2 + 2X - 3 < 0$$

- (83) Solve the quadratic inequality. Write the solution in interval notation.
Graph the solution.

$$(X - 3)^2 \geq 1$$

- (84) Solve the quadratic inequality. Write the solution in interval notation.
Graph the solution.

$$X^2 > 4$$

- (85) Solve the quadratic inequality. Write the solution in interval notation.
Graph the solution.

$$X^2 + 4X - 21 < 0$$

- (86) Solve the quadratic inequality. Write the solution in interval notation.

$$2X^2 - 13X - 30 \geq 15$$

- (87) Solve the following rational inequality. Give the answer in interval notation.

$$\frac{1}{X} - 4 < 0$$

- (88) Solve the following rational inequality. Give the answer in interval notation.

$$\frac{X - 1}{X + 5} > 0$$

- (89) Solve the following rational inequality. Give the answer in interval notation.

$$\frac{2X - 12}{X - 13} \geq 0$$

- (90) Solve the following rational inequality. Give the answer in interval notation.

$$\frac{3X + 3}{X - 100} \leq 0$$

- (91) Solve the following rational inequality. Give the answer in interval notation.

$$\frac{5 + 7X}{1 + 2X} < 4$$

- (92) Solve the following rational inequality. Give the answer in interval notation.

$$\frac{3X - 5}{X - 5} > 4$$

- (93) Solve the following rational inequality. Give the answer in interval notation.

$$\frac{X - 25}{14} \leq 0$$

Absolute Value Equations and Inequalities

- (94) Solve the equation.

$$|X - 2| = 3$$

- (95) Solve the equation.

$$|X + 1| = 2$$

- (96) Solve the equation.

$$\left| \frac{5}{T - 3} \right| = 10$$

- (97) Solve the equation.

$$|X - 7| = |2X + 18|$$

- (98) Solve the equation.

$$|X - 18| = |3X|$$

(99) Solve the inequality. Write your answer in interval notation.

$$|X| < -99$$

(100) Solve the inequality. Write your answer in interval notation.

$$|X - 2| < 1$$

(101) Solve the inequality. Write your answer in interval notation.

$$|X| \leq 4$$

(102) Solve the inequality. Write your answer in interval notation.

$$\left|X - \frac{3}{2}\right| \geq \frac{3}{2}$$

(103) Solve the inequality. Write your answer in interval notation.

$$|X + 3| > 4$$

WORD PROBLEMS

***Mixture Word Problems**

(104) How much pure blood must Dracula pour into a barrel filled with 3 gallons of 60% blood solution to end up with a 90% blood solution?

- (105) How much 40% sugar solution must be mixed with 25 gallons of 70% sugar solution to end up with a 50% sugar solution?
- (106) How much 95-octane gas must be added to 20 liters of 98-octane gas to make a 96-octane mixture?
- (107) How much water must be added to 10 quarts of an 80% mixture of antifreeze to dilute the solution so that you have a 50% antifreeze mixture?
- (108) Jonathan needs 12 liters of 60% insulin solution. He currently has some 20% insulin solution and some 80% insulin solution. How much of each should Jonathan mix together to get the insulin solution of the strength and amount he needs?
- (109) Polly wishes to mix coffee worth \$7 per pound with 12 pounds of coffee worth \$4 per pound. How many pounds of coffee worth \$7 per pound must be mixed to obtain a mixture worth \$6 per pound? -

- (110) Sinjin has a 30-gallon radiator on his truck. Currently, the radiator is filled with 40% antifreeze solution. However, Sinjin is planning to take a driving tour of the North Pole and the local gasoline station owner has told Sinjin that he thinks the truck will need a 60% antifreeze mixture to keep from freezing up during the trip. How much of the 40% antifreeze solution must Sinjin drain from his radiator and fill with 90% antifreeze solution to get the strength antifreeze solution he needs?
- (111) How many pounds of gumballs costing \$4 a pound must be mixed with 24 pounds of peppermints costing \$10 a pound to get a Christmas candy mixture which would sell for \$5 a pound?
- (112) The radiator of Mark's 1968 Dodge Challenger has a capacity of 16 quarts. If it is presently filled with a 20% antifreeze solution, how many quarts must Mark drain and replace with pure antifreeze to make the radiator contain a 50% antifreeze solution?
- (113) How many liters of a 25% salt solution must be added to 80 liters of a 40% salt solution to get a solution that is 30% salt?

- (114) A butcher combined hamburger that cost \$3.50 per pound with hamburger that cost \$4.10 per pound. How many pounds of each were used to make 80 pounds of a mixture that sells for \$3.65 per pound?
- (115) How many pints of 75% buttermilk drink must be added to 15 pints of a 10% buttermilk drink to make a 25% buttermilk drink?
- (116) How many grams of a 60% silver alloy must be mixed with 150 grams of a 20% silver alloy to get an alloy which is 50% silver?

DISTANCE PROBLEMS

- (117) Two planes leave an airport at the same time. One plane flies north at 500 miles per hour. The other flies south at 650 miles per hour. In how many hours will the planes be 4025 miles apart?

- (118) Two joggers, Sonya and Jeri, start from the same point at the same time and run in the same direction. Sonya jogs 8 miles per hour and Jeri jogs at 11 miles per hour. In how many hours will Sonya and Jeri be 9 miles apart?
- (119) Two rockets are to be launched in the same direction one hour apart. The first rocket travels 12,000 miles per hour. Later, the second rocket is launched to destroy the first rocket. The second rocket travels 14,400 miles per hour. How long will it take the second rocket to catch up with the first rocket?
- (120) A mother and daughter go hiking on the Appalachian Trail. The mother hikes at an average of 4 miles per hour. The daughter hikes at 5 miles per hour. The mother begins hiking. $\frac{1}{2}$ hour later the daughter begins hiking from the same point going in the exact same direction. How many hours will it take the daughter to catch up with the mother?

- (121) Tia traveled from Troy to her home in north Alabama. The trip home took Tia 12 hours because she knew that Smokie was "awatchin." Returning back to Troy the trip took Tia 8 hours. Tia's speed returning to Troy was 30 miles per hour faster than her speed going home. How far from Troy does Tia live? Assume Tia always drives the same route.
- (122) Two trains leave the same station along parallel tracks going in opposite directions. The train traveling east has a speed of 40 miles per hour. The train traveling west has a speed of 60 miles per hour. In how many hours will the trains be 500 miles apart if the trains leave at the same time?
- (123) Billie Buzzard is happily flying along at 5 miles per hour. He realizes a jet is coming straight at him traveling 355 miles per hour. When Billie sees the jet it is still 18 miles away. Billie can change his flight path and miss the jet in 4 minutes. Will Billie live or be eaten by the jet?

- (124) Joan leaves her home traveling 60 miles per hour. One hour later Bette realizes that Joan forgot her briefcase, and takes off by the same route to catch Joan. Bette travels at the rate of 75 miles per hour. How many hours will it take Bette to catch up with Joan?
- (125) Two cars leave the same point at the same time. One travels 45 miles per hour due east. The other car travels 55 miles per hour due west. How many hours until the cars are 750 miles apart?

INTEREST PROBLEMS

- (126) Fabio won \$4,000. He put some of his money in a bank which pays a simple interest rate of 8%. The remainder of his money Fabio put in a bank which pays a simple interest rate of 10%. Fabio made \$340 in simple interest for the year. How much did Fabio put in each bank?

- (127) Hamlet put an amount of money in Shakespeare Bank at a rate of 12%. He put \$500 more than 3 times the amount in Macbeth Bank at a 7% simple interest rate. Hamlet made \$101 in annual simple interest. How much money did Hamlet have in each bank?
- (128) Bobo invested \$15,000, part at 8% simple interest and the rest at 6% simple interest for a period of 1 year. How much did Bobo invest at each rate if his total interest for the year was \$1100?
- (129) May invested \$8900, part at 8% simple interest and the rest at 11% simple interest for a period of 1 year. How much does May invest at each rate if her total annual interest from both investments is \$874?
- (130) Bobby put some money in Jipya Bank at a 7% rate of simple interest. He put 3 times as much money in Rippoff Bank at a simple interest rate of 9%. Bobby earned \$136 in simple interest for the year. How much money did Bobby put in each bank?

- (131) Julio invested \$5000, part at 10% simple interest and part at 15% simple interest for a period of 1 year. How much did he invest at each rate if the same amount of interest was received from each investment?
- (132) Sissy invested some money at 7%. She invested the same amount plus \$500 at 9%. Sissy made \$173 in simple interest for the year. How much did Sissy invest at each rate?
- (133) For one year, Kincaid put some money in one investment which paid at a rate of 12% simple interest. He put $\frac{1}{2}$ as much money in a second investment which lost money at a rate of 8% simple interest. How much did Kincaid invest at each rate if he made \$48 for the year?

ANSWERS

(1) -4

(3) $-\frac{6}{5}$

(5) 10

(7) 4

(9) -20

(11) $\frac{5}{3}$

(13) *no solution*

(15) $\frac{1}{5}$

(17) $M = \frac{PY}{144}$

(19) $n = m - T$

(21) $\pi = \frac{A}{r^2}$

(23) $F = \frac{w}{d}$

(25) $w = \frac{CL}{100}$

(27) $\frac{ca}{a-c}$

(29) $Y = \frac{d-2X}{2}$

(31) $\{-3, 1\}$

(33) $\{-7, 0, \frac{1}{2}\}$

(2) -10

(4) 6

(6) $\frac{1}{2}$

(8) 3

(10) *no solution*

(12) 0

(14) $\frac{9}{7}$

(16) $r = \frac{d}{t}$

(18) $b = P - a - c$

(20) $W = \frac{V}{ln}$

(22) $h = \frac{2A}{B+b}$

(24) $m = \frac{Y-Y_1}{X-X_1}$

(26) $C = \frac{100M}{I}$

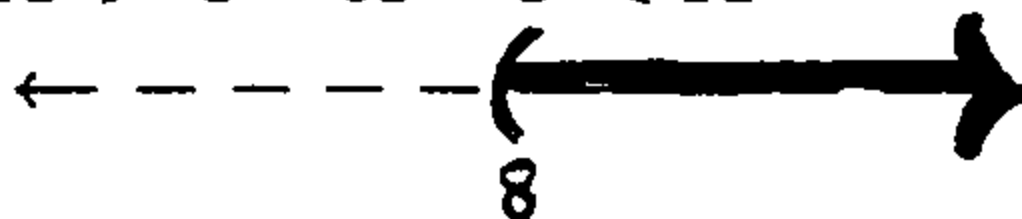
(28) $m = \frac{-2}{a-b}$ or $\frac{2}{b-a}$


(30) $t = \frac{K}{a+b+c}$

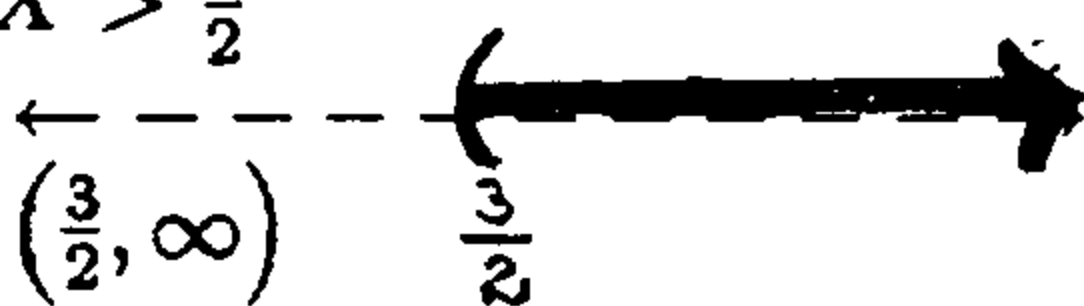
(32) $\{0, 5\}$

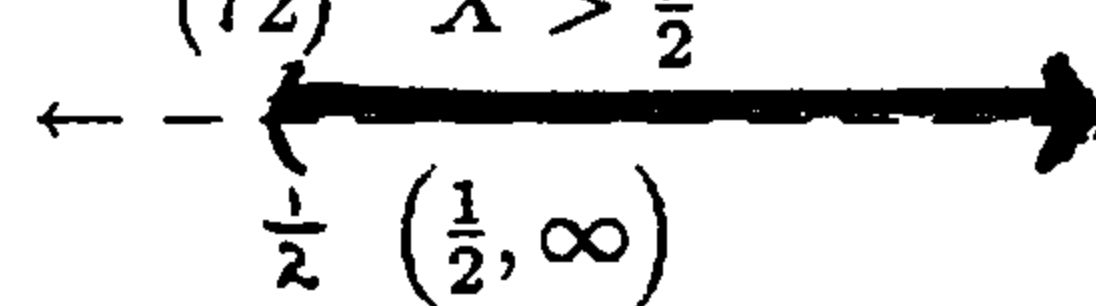
(34) $\{-\frac{6}{5}, \frac{3}{2}\}$

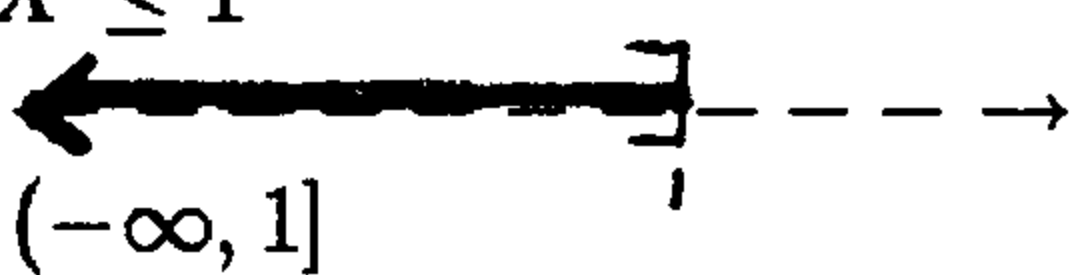
- (35) $\{-\frac{1}{2}, 0\}$
- (37) $\{-2, 4\}$
- (39) $\{2, 6\}$
- (41) $\{-a\}$
- (43) $\{-\frac{7}{4}\}$
- (45) $\{-8, 1\}$
- (47) $\{3, 5\}$
- (49) $\{+4, -4\}$
- (51) $\{+2\sqrt{3}, -2\sqrt{3}\}$
- (53) $\{-13 - \sqrt{21}, -13 + \sqrt{21}\}$
- (55) 25
- (57) $\{\frac{3}{2}\}$
- (59) $\{6 - \sqrt{11}, 6 + \sqrt{11}\}$
- (61) $\frac{2}{7}$
- (63) $\{1 - \sqrt{3}, 1 + \sqrt{3}\}$
- (65) $\{-5, 6\}$
- (67) $\{0, -\frac{1}{4}, -\frac{1}{3}\}$
- (36) $\{-\frac{1}{3}, \frac{1}{3}\}$
- (38) $\{1, 9\}$
- (40) $\{-\frac{1}{2}, 3\}$
- (42) $\{-a - b, -a + b\}$
- (44) $\{-\frac{3}{2}, 11\}$
- (46) $\{1\}$
- (48) $\{-2, 3\}$
- (50) $\{+\sqrt{7}, -\sqrt{7}\}$
- (52) $\{5 + 2\sqrt{5}, 5 - 2\sqrt{5}\}$
- (54) $\{2\}$
- (56) $\{\frac{-3+3\sqrt{5}}{2}, \frac{-3-3\sqrt{5}}{2}\}$
- (58) $\{-1, \frac{1}{2}\}$
- (60) $\{-\frac{3}{4}, \frac{1}{4}\}$
- (62) $\{-\frac{1}{2} - \sqrt{2}, -\frac{1}{2} + \sqrt{2}\}$
- (64) $\{-\frac{4}{3}\}$
- (66) $\{-2, 0, 4\}$
- (68) $\{-6, -3, 2, 5\}$

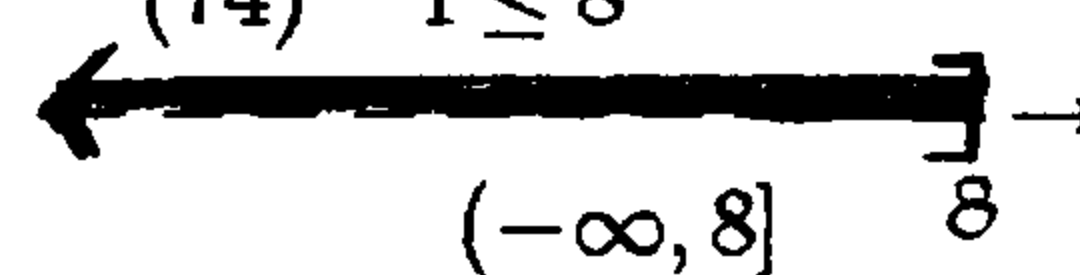
(69) $X > 8$ or $8 < X$


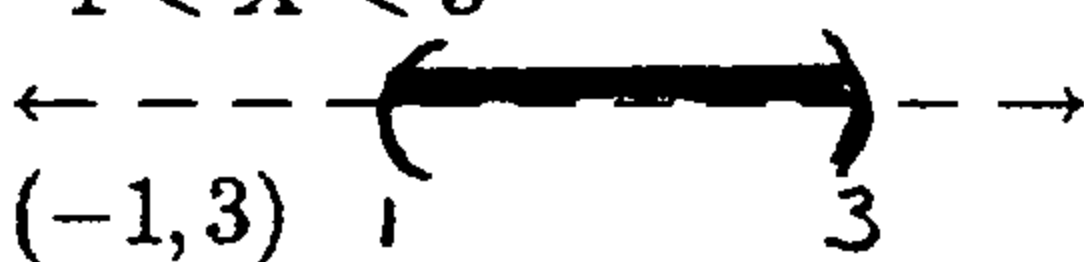
(70) $X \leq 2$


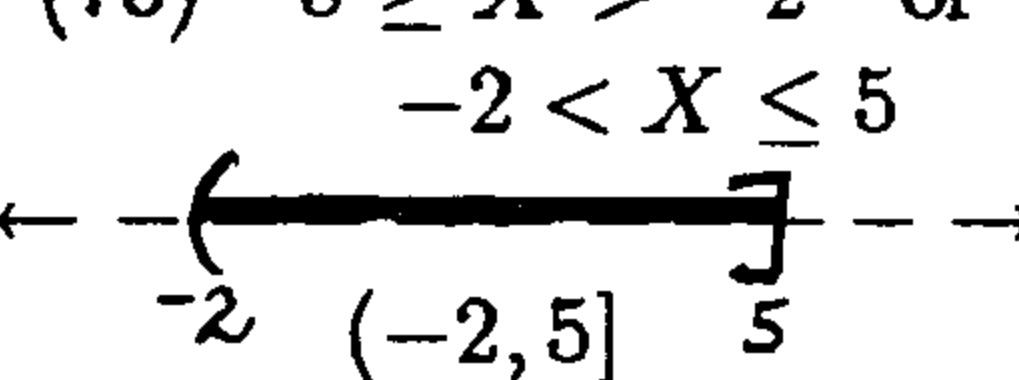
(71) $X > \frac{3}{2}$


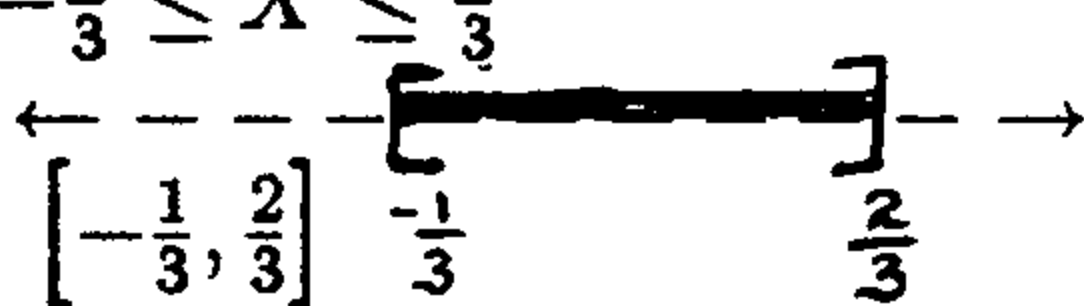
(72) $X > \frac{1}{2}$


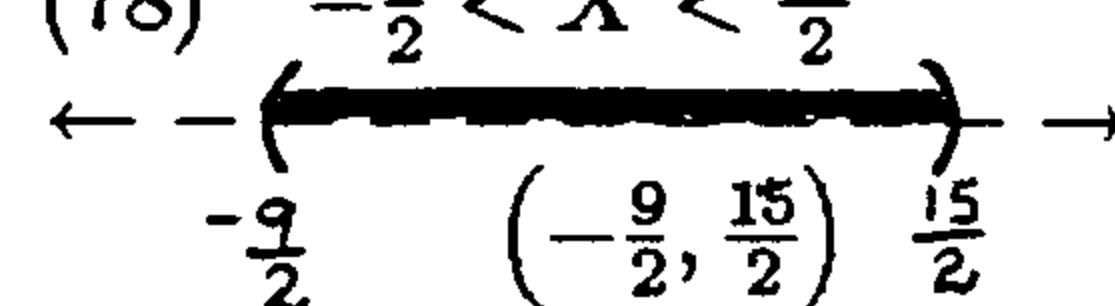
(73) $X \leq 1$


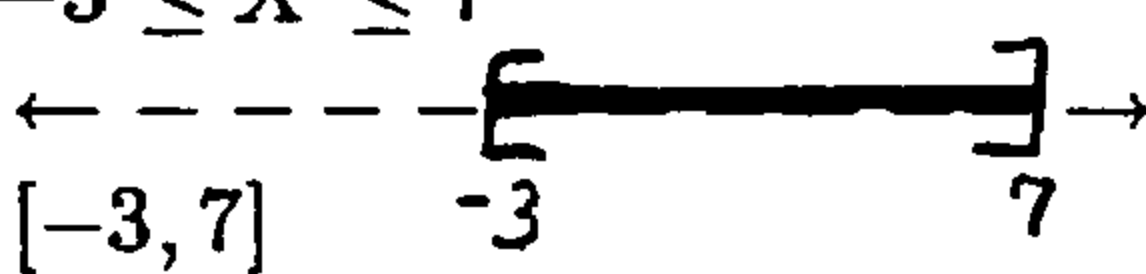
(74) $Y \leq 8$


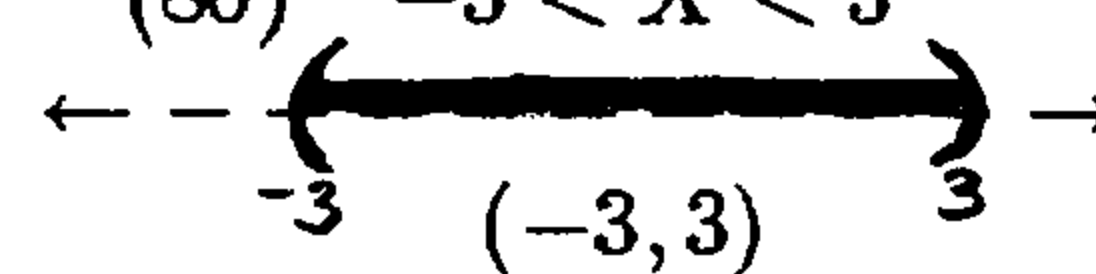
(75) $-1 < X < 3$


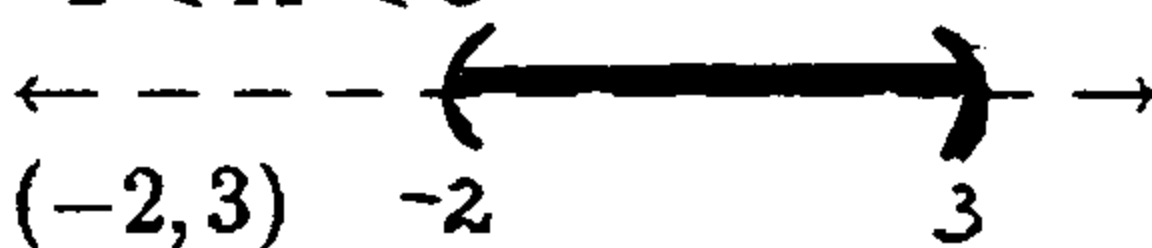
(76) $5 \geq X > -2$ or $-2 < X \leq 5$


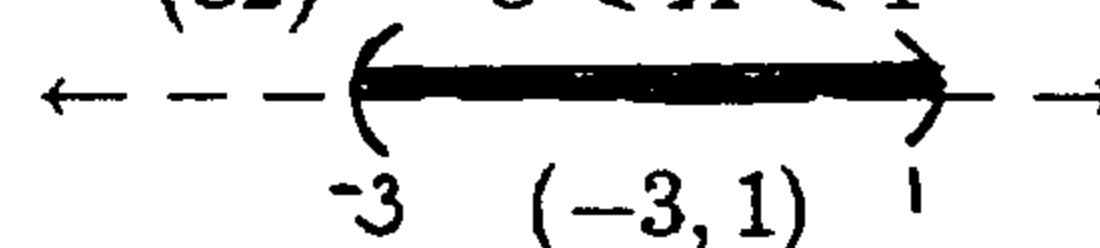
(77) $-\frac{1}{3} \leq X \leq \frac{2}{3}$


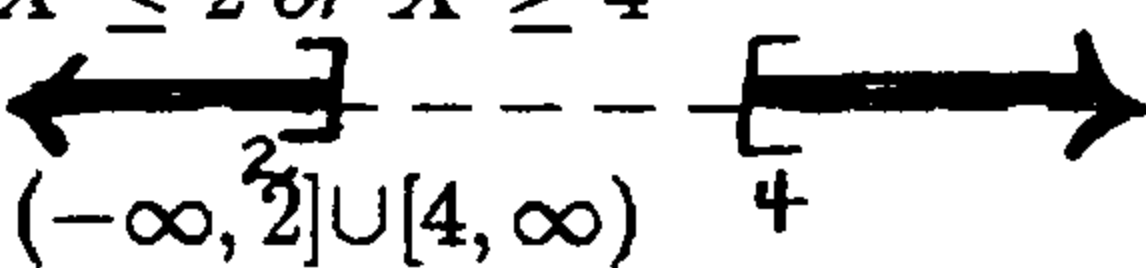
(78) $-\frac{9}{2} < X < \frac{15}{2}$


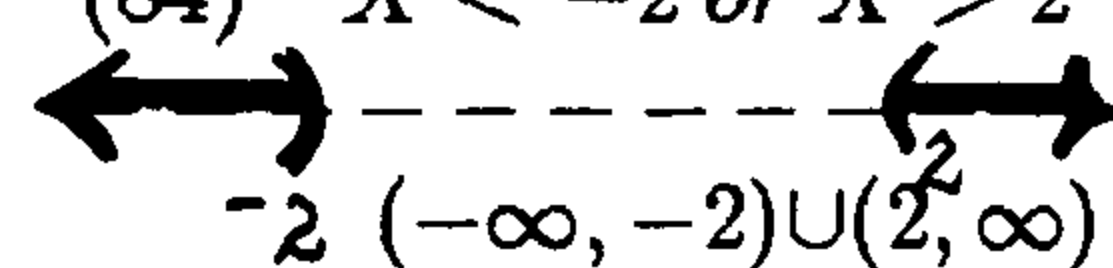
(79) $-3 \leq X \leq 7$



(80) $-3 < X < 3$


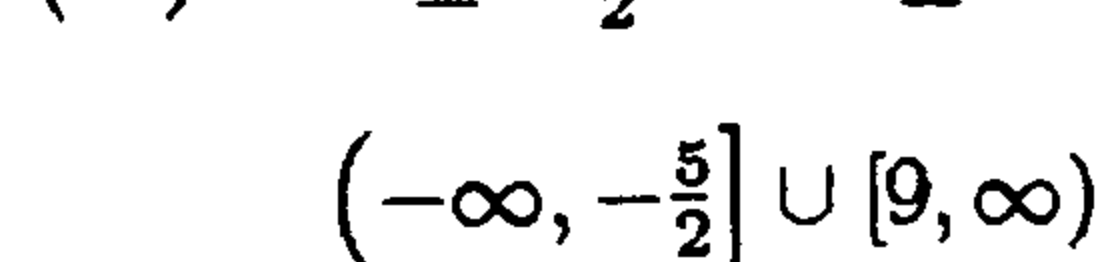
(81) $-2 < X < 3$


(82) $-3 < X < 1$


(83) $X \leq 2$ or $X \geq 4$


(84) $X < -2$ or $X > 2$


(85) $-7 < X < 3$


(86) $X \leq -\frac{5}{2}$ or $X \geq 9$


(87) $(-\infty, 0) \cup (\frac{1}{4}, \infty)$

(88) $(-\infty, -5) \cup (1, \infty)$

- (89) $(-\infty, 6] \cup (13, \infty)$
- (91) $(-\infty, -\frac{1}{2}) \cup (1, \infty)$
- (93) $(-\infty, 25]$
- (95) $\{-3, 1\}$
- (97) $\{-25, -\frac{11}{3}\}$
- (99) no solution
- (101) $-4 \leq X \leq 4$
Interval Notation.: $[-4, 4]$
- (103) $X < -7$ or $X > 1$
Interval Notation: $(-\infty, -7) \cup (1, \infty)$
- (105) 50 gallons
- (107) 6 quarts
- (109) 24 pounds of \$7 per pound coffee
- (111) 120 pounds
- (113) 160 liters
- (115) $\frac{9}{2}$ pints
- (90) $[-1, 100)$
- (92) $(5, 15)$
- (94) $\{-1, 5\}$
- (96) $\{\frac{5}{2}, \frac{7}{2}\}$
- (98) $\{-9, \frac{9}{2}\}$
- (100) $1 < X < 3$
Interval Notation .: $(1, 3)$
- (102) $X \leq 0$ or $X \geq 3$.
Interval Notation:
 $(-\infty, 0] \cup [3, \infty)$
- (104) 9 gallons
- (106) 40 liters
- (108) 4 liters of 20%
8 liters of 80%
- (110) 12 gallons of the
40% must be
drained and
replaced with 90%
- (112) 6 quarts
- (114) 60 lb of \$3.50
20 lb of \$4.10
- (116) 450 grams

(117) $\frac{7}{2}$ hour

(118) 3 hours

(119) 5 hours

(120) 2 hours

(121) 720 miles

(122) 5 hours

(123) Billie is toast!
He and the jet will collide
in 3 minutes ($\frac{1}{20}$ hours)

(124) 4 hours

(125) $\frac{15}{2}$ hours

(126) \$ 3000 in 8% bank

\$ 1000 in 10% bank

(127) \$ 200 in the 12% bank
\$ 1100 in the 7% bank

(128) \$ 5000 at 6 %
\$ 10,000 at 8%

(129) \$ 3500 at 8%
\$ 5400 at 11%

(130) \$ 400 at 7%
\$ 1200 at 9 %

(131) \$ 3000 at 10%
\$ 2000 at 15%

(132) \$ 800 at 7%
\$ 1300 at 8 %

(133) \$ 600 at 12%
\$ 300 at 8%