4.6

1) A tank contains 8000 liters of a solution that is 40% acid. How much water should be added to make a solution that is 30% acid?

A	P	T
8000	.4	3200
w	0	0
8000+w	.3	2400+.3w

$$3200 = 2400 + .3w$$
$$-2400 \quad -2400$$
$$\frac{800}{.3} = \frac{.3w}{.3}$$
$$w = 2{,}666.67\ L.$$

3) Of 12 pounds of salt water 10% is salt; of another mixture 3% is salt. How many pounds of the second should be added to the first in order to get a mixture of 5% salt?

A	P	T
12	.1	1.2
x	.03	.03x
12+x	.05	.6+.05x

$$1.2 + .03x = .6 + .05x$$
$$-.03x \quad -.03x$$
$$1.2 = .6 + .02x$$
$$-.6 \quad -.6$$
$$\frac{.6}{.02} = \frac{.02x}{.02}$$
$$x = 30\ lbs$$

5) How many pounds of a 4% solution of borax must be added to 24 pounds of a 12% solution of borax to obtain a 10% solution of borax?

A	P	T
x	.04	.04x
24	.12	2.88
x+24	.10	.1x+.24

$$.04x + 2.88 = .1x + 2.4$$
$$-.04x \quad -.04x$$
$$2.88 = .06x + 2.4$$
$$-2.4 \quad -2.4$$
$$\frac{.48}{.06} = \frac{.06x}{.06}$$
$$x = 8\ lbs$$

7) A 100 LB bag of animal feed is 40% oats. How many pounds of oats must be added to this feed to produce a mixture which is 50% oats?

A	P	T
100	.4	40
x	1	X
100+x	.5	50+.5x

$$40 + x = 50 + .5x$$
$$-.5x \quad -.5x$$
$$40 + .5x = 50$$
$$-40 \quad -40$$
$$\frac{.5x}{.5} = \frac{10}{.5}$$
$$x = 20\ lbs$$

9) How many pounds of tea that cost $4.20 per pound must be mixed with 12 lb of tea that cost $2.25 per pound to make a mixture that costs $3.40 per pound?

A	P	T
x	4.2	4.2x
12	2.25	27
x+12	3.40	3.4x+40.8

$$4.2x + 27 = 3.4x + 40.8$$
$$-3.4x \quad -3.4x$$
$$0.8x + 27 = 40.8$$
$$-27 \quad -27$$
$$\frac{0.8x}{0.8} = \frac{13.8}{.8}$$
$$x = 12.25\ lbs$$

11) How many kilograms of hard candy that cost $7.50 per kilogram must be mixed with 24 kg of jelly beans that cost $3.25 per kilogram to make a mixture that sells for $4.50 per kilogram?

A	P	T
x	7.5	7.5x
24	3.25	78
x+24	4.5	4.5x+108

$$7.5x + 78 = 4.5x + 108$$
$$-4.5x \quad -4.5x$$
$$3x + 78 = 108$$
$$-78 \quad -78$$
$$\frac{3x}{3} = \frac{30}{3}$$
$$x = 10kg$$

13) How many pounds of lima beans that cost 90¢ per pound must be mixed with 16 lb of corn that cost 50¢ per pound to make a mixture of vegetables that costs 65¢ per pound?

A	P	T
x	.9	.9x
16	.5	8
X+16	.65	.65x+10.4

$$.9x + 8 = .65x + 10.4$$
$$-.65x \quad -.65x$$
$$.25x + 8 = 10.4$$
$$-8 \quad -8$$
$$\frac{.25x}{.25} = \frac{2.4}{.25}$$
$$x = 9.6\ lbs$$

15) Solution A is 50% acid and solution B is 80% acid. How much of each should be used to make 100cc. of a solution that is 68% acid?

A	P	T
A	.5	.5A
B	.8	.8B
100	.68	68

$$-.5(A + B) = (100)(-.5)$$
$$.5A + .8B = 68$$
$$-.5A - .5B = -50$$
$$\frac{.3B}{.3} = \frac{18}{.3}$$
$$B = 60$$

$$A + 60 = 100$$
$$-60 \quad -60$$
$$A = 40$$

$60\ cc\ of\ 80\%$

$40\ cc\ of\ 50\%$

17) A farmer has some cream which is 21% butterfat and some which is 15% butter fat. How many gallons of each must be mixed to produce 60 gallons of cream which is 19% butterfat?

A	P	T
A	.21	.21A
B	.15	.15B
60	.19	11.4

$-.15(A+B)=(60)(-.15)$

$.21A+.15B=11.4$

$-.15A-.15B=-9$

$\frac{.06A}{.06}=\frac{2.4}{.06}$

$A=40$

$40+B=60$

$-40 \quad -40$

$B=20$

$40\ gal\ 21\%$

$20\ gal\ 15\%$

19) A chemist wants to make 50ml of a 16% acid solution by mixing a 13% acid solution and an 18% acid solution. How many milliliters of each solution should the chemist use?

A	P	T
x	.13	.13x
y	.18	.18y
50	.16	8

$-.13(x+y)=(50)(-.13)$

$.13x+.18y=8$

$-.13x-.13y=-6.5$

$\frac{.05y}{.05}=\frac{1.5}{.05}$

$y=30$

$x+30=50$

$-30 \quad -30$

$x=20$

$20\ mL\ 13\%$

$30\ mL\ 18\%$

21) A paint that contains 21% green dye is mixed with a paint that contains 15% green dye. How many gallons of each must be used to make 60 gal of paint that is 19% green dye?

A	P	T
x	.21	.21x
y	.15	.15y
60	.19	11.4

$-.15(x+y)=(60)(-.15)$

$.21x+.15y=11.4$

$-.15x-.15y=-9$

$\frac{.06x}{.06}=\frac{2.5}{.06}$

$x=40$

$40+y=60$

$-40 \quad -40$

$y=20$

$40\ gal\ 21\%$

$20\ gal\ 15\%$

23) To make a weed and feed mixture, the Green Thumb Garden Shop mixes fertilizer worth $4.00/lb. with a weed killer worth $8.00/lb. The mixture will cost $6.00/lb. How much of each should be used to prepare 500 lb. of the mixture?

A	P	T
x	4	4x
y	8	8y
500	6	3000

$-4(x+y)=(500)(-4)$

$4x+8y=3000$

$-4x-4y=-2000$

$\frac{4y}{4}=\frac{1000}{4}$

$y=250$

$x+250=500$

$-250 \quad -250$

$x=250$

$250\ lbs$ @ \$4

$250\ lbs$ @ \$8

25) A grocer wishes to mix sugar at 9 cents per pound with sugar at 6 cents per pound to make 60 pounds at 7 cents per pound. What quantity of each must he take?

A	P	T
x	9	9x
y	6	6y
60	7	420

$-6(x+y) = (60)(-6)$

$9x + 6y = 420$

$-6x - 6y = -360$

$\frac{3x}{3} = \frac{60}{3}$

$x = 20$

$20 + y = 60$

$-20 \quad -20$

$y = 40$

$20\ lbs$ @ 9¢

$40\ lbs$ @ 6¢

27) A goldsmith combined an alloy that costs S4.30 per ounce with an alloy that costs $1.80 per ounce. How many ounces of each were used to make a mixture of 200 oz costing $2.50 per ounce?

A	P	T
x	4.30	4.3x
y	1.80	1.80y
200	2.50	500

$-1.8(x+y) = (200)(-1.8)$

$4.3x + 1.8y = 500$

$-1.8x - 1.8y = -360$

$\frac{2.5x}{2.5} = \frac{140}{2.5}$

$x = 56$

$56 + y = 200$

$-56 \quad -56$

$y = 144$

$56\ oz.$ @ $4.30

$144\ oz.$ @ $1.80

29) The manager of a garden shop mixes grass seed that is 60% rye grass with 70 lb of grass seed that is 80% rye grass to make a mixture that is 74% rye grass. How much of the 60% mixture is used?

A	P	T
x	.6	.6x
70	.8	56
x+70	.74	.74x+51.8

$.6x + 56 = .74x + 51.8$

$-.6x \quad -.6x$

$56 = .45x + 51.8$

$-51.8 \quad -51.8$

$\frac{4.2}{.14} = \frac{.14x}{.14}$

$30\ lbs = x$

31) A caterer made an ice cream punch by combining fruit juice that cost $2.25 per gallon with ice cream that costs $3.25 per gallon. How many gallons of each were used to make 100 gal of punch costing $2.50 per pound?

A	P	T
x	2.25	2.25x
y	3.25	3.25y
100	2.5	250

$-2.25(x+y) = (100)(-2.25)$

$2.25x + 3.25y = 250$

$-2.25x - 2.25y = -225$

$y = 25$

$x + 25 = 100$

$-25 \quad -25$

$x = 75$

$75\ gal$ @ $2.25

$25\ gal$ @ $3.25

33) A carpet manufacturer blends two fibers, one 20% wool and the second 50% wool. How many pounds of each fiber should be woven together to produce 600 lb of a fabric that is 28% wool?

A	P	T
x	.2	.2x
y	.5	.5y
600	.28	168

$-.2(x+y) = (600)(-.2)$

$.2x + .5y = 168$

$-2.x - .2y = -120$

$\frac{.3y}{.3} = \frac{48}{.3}$

$y = 160$

$x + 160 = 600$

$-160 - 160$

$x = 440$

$440\ lbs$ @ 20%

$160\ lbs$ @ 50%

35) The manager of a specialty food store combined almonds that cost $4.50 per pound with walnuts that cost S2.50 per pound. How many pounds of each were used to make a 100 lb mixture that cost $3.24 per pound?

A	P	T
x	4.50	4.5x
y	2.50	2.5y
100	3.24	324

$-2.5(x+y) = (100)(-2.5)$

$4.5x + 2.5y = 324$

$-2.5x - 2.5y = -250$

$\frac{2x}{2} = \frac{74}{2}$

$x = 37$

$37 + y = 100$

$-37 \quad -37$

$y = 63$

$37\ lbs$ @ \$4.50

$63\ lbs$ @ \$2.50

37) How many ounces of dried apricots must be added to 18 oz of a snack mix that contains 20% dried apricots to make a mixture that is 25% dried apricots?

A	P	T
x	1	x
18	.2	3.6
x+18	.25	.25x+4.5

$x + 3.6 = .25x + 4.5$

$-.25x \quad -.25x$

$.75x + 3.6 = 4.5$

$-3.6 \quad -3.6$

$\frac{.75x}{.75} = \frac{0.9}{.75}$

$x = 1.2\ oz$

39) How many ounces of pure bran flakes must be added to 50 oz. of cereal that is 40% bran flakes to produce a mixture that is 50% bran flakes?

A	P	T
x	1	x
50	.4	20
x+50	.5	.5x+25

$x + 20 = .5x + 25$

$-.5x \quad -.5x$

$.5x + 20 = 25$

$-20 \quad -20$

$\frac{.5x}{.5} = \frac{5}{.5}$

$x = 10\ oz$

41) How many grams of pure water must be added to 50 g of pure acid to make a solution that is 40% acid?

A	P	T
w	0	0
50	1	50
w+50	.4	.4w+20

$$50 = .4w + 20$$
$$-20 \qquad -20$$
$$\frac{30}{.4} = \frac{.4w}{.4}$$
$$75g = w$$

43) How many ounces of pure water must be added to 50 oz of a 15% saline solution to make a saline solution that is 10% salt?

A	P	T
x	0	0
50	.15	7.5
x+50	.10	.1x+5

$$7.5 = .1x + 5$$
$$-5 \qquad -5$$
$$\frac{2.5}{.1} = \frac{.1x}{.1}$$
$$25oz = x$$