Homework Packet 7 - Answer Key

Multiplication Facts to 100 (F) Answers

Name: ________________ Date: ________________ Score: ____ /100

Calculate each product.

$\begin{array}{r}3\\ \times 9\\ \hline 27\end{array}$	$\begin{array}{r}6\\ \times 8\\ \hline 48\end{array}$	$\begin{array}{r}7\\ \times 2\\ \hline 14\end{array}$	$\begin{array}{r}7\\ \times 4\\ \hline 28\end{array}$	$\begin{array}{r}10\\ \times 2\\ \hline 20\end{array}$	$\begin{array}{r}6\\ \times 7\\ \hline 42\end{array}$	$\begin{array}{r}8\\ \times 4\\ \hline 32\end{array}$	$\begin{array}{r}2\\ \times 8\\ \hline 16\end{array}$	$\begin{array}{r}3\\ \times 4\\ \hline 12\end{array}$	$\begin{array}{r}2\\ \times 9\\ \hline 18\end{array}$
$\begin{array}{r}4\\ \times 8\\ \hline 32\end{array}$	$\begin{array}{r}10\\ \times 3\\ \hline 30\end{array}$	$\begin{array}{r}7\\ \times 9\\ \hline 63\end{array}$	$\begin{array}{r}3\\ \times 3\\ \hline 9\end{array}$	$\begin{array}{r}2\\ \times 7\\ \hline 14\end{array}$	$\begin{array}{r}8\\ \times 7\\ \hline 56\end{array}$	$\begin{array}{r}9\\ \times 6\\ \hline 54\end{array}$	$\begin{array}{r}5\\ \times 6\\ \hline 30\end{array}$	$\begin{array}{r}4\\ \times 2\\ \hline 8\end{array}$	$\begin{array}{r}9\\ \times 5\\ \hline 45\end{array}$
$\begin{array}{r}4\\ \times 4\\ \hline 16\end{array}$	$\begin{array}{r}7\\ \times 5\\ \hline 35\end{array}$	$\begin{array}{r}5\\ \times 8\\ \hline 40\end{array}$	$\begin{array}{r}4\\ \times 7\\ \hline 28\end{array}$	$\begin{array}{r}9\\ \times 4\\ \hline 36\end{array}$	$\begin{array}{r}6\\ \times 6\\ \hline 36\end{array}$	$\begin{array}{r}5\\ \times 5\\ \hline 25\end{array}$	$\begin{array}{r}10\\ \times 5\\ \hline 50\end{array}$	$\begin{array}{r}5\\ \times 2\\ \hline 10\end{array}$	$\begin{array}{r}8\\ \times 9\\ \hline 72\end{array}$
$\begin{array}{r}7\\ \times 10\\ \hline 70\end{array}$	$\begin{array}{r}10\\ \times 4\\ \hline 40\end{array}$	$\begin{array}{r}2\\ \times 2\\ \hline 4\end{array}$	$\begin{array}{r}10\\ \times 8\\ \hline 80\end{array}$	$\begin{array}{r}10\\ \times 9\\ \hline 90\end{array}$	$\begin{array}{r}3\\ \times 2\\ \hline 6\end{array}$	$\begin{array}{r}3\\ \times 8\\ \hline 24\end{array}$	$\begin{array}{r}3\\ \times 10\\ \hline 30\end{array}$	$\begin{array}{r}9\\ \times 9\\ \hline 81\end{array}$	$\begin{array}{r}2\\ \times 5\\ \hline 10\end{array}$
$\begin{array}{r}4\\ \times 6\\ \hline 24\end{array}$	$\begin{array}{r}6\\ \times 5\\ \hline 30\end{array}$	$\begin{array}{r}7\\ \times 6\\ \hline 42\end{array}$	$\begin{array}{r}8\\ \times 2\\ \hline 16\end{array}$	$\begin{array}{r}3\\ \times 7\\ \hline 21\end{array}$	$\begin{array}{r}5\\ \times 9\\ \hline 45\end{array}$	$\begin{array}{r}7\\ \times 8\\ \hline 56\end{array}$	$\begin{array}{r}6\\ \times 10\\ \hline 60\end{array}$	$\begin{array}{r}9\\ \times 2\\ \hline 18\end{array}$	$\begin{array}{r}3\\ \times 6\\ \hline 18\end{array}$
$\begin{array}{r}9\\ \times 10\\ \hline 90\end{array}$	$\begin{array}{r}3\\ \times 5\\ \hline 15\end{array}$	$\begin{array}{r}8\\ \times 8\\ \hline 64\end{array}$	$\begin{array}{r}5\\ \times 7\\ \hline 35\end{array}$	$\begin{array}{r}4\\ \times 9\\ \hline 36\end{array}$	$\begin{array}{r}9\\ \times 7\\ \hline 63\end{array}$	$\begin{array}{r}6\\ \times 2\\ \hline 12\end{array}$	$\begin{array}{r}2\\ \times 4\\ \hline 8\end{array}$	$\begin{array}{r}6\\ \times 9\\ \hline 54\end{array}$	$\begin{array}{r}2\\ \times 6\\ \hline 12\end{array}$
$\begin{array}{r}8\\ \times 10\\ \hline 80\end{array}$	$\begin{array}{r}8\\ \times 6\\ \hline 48\end{array}$	$\begin{array}{r}4\\ \times 3\\ \hline 12\end{array}$	$\begin{array}{r}6\\ \times 4\\ \hline 24\end{array}$	$\begin{array}{r}2\\ \times 10\\ \hline 20\end{array}$	$\begin{array}{r}5\\ \times 3\\ \hline 15\end{array}$	$\begin{array}{r}8\\ \times 3\\ \hline 24\end{array}$	$\begin{array}{r}9\\ \times 8\\ \hline 72\end{array}$	$\begin{array}{r}5\\ \times 10\\ \hline 50\end{array}$	$\begin{array}{r}5\\ \times 4\\ \hline 20\end{array}$
$\begin{array}{r}9\\ \times 3\\ \hline 27\end{array}$	$\begin{array}{r}2\\ \times 3\\ \hline 6\end{array}$	$\begin{array}{r}4\\ \times 5\\ \hline 20\end{array}$	$\begin{array}{r}7\\ \times 3\\ \hline 21\end{array}$	$\begin{array}{r}7\\ \times 7\\ \hline 49\end{array}$	$\begin{array}{r}4\\ \times 10\\ \hline 40\end{array}$	$\begin{array}{r}10\\ \times 7\\ \hline 70\end{array}$	$\begin{array}{r}8\\ \times 5\\ \hline 40\end{array}$	$\begin{array}{r}10\\ \times 10\\ \hline 100\end{array}$	$\begin{array}{r}10\\ \times 6\\ \hline 60\end{array}$
$\begin{array}{r}6\\ \times 3\\ \hline 18\end{array}$	$\begin{array}{r}3\\ \times 9\\ \hline 27\end{array}$	$\begin{array}{r}10\\ \times 6\\ \hline 60\end{array}$	$\begin{array}{r}6\\ \times 5\\ \hline 30\end{array}$	$\begin{array}{r}6\\ \times 10\\ \hline 60\end{array}$	$\begin{array}{r}10\\ \times 9\\ \hline 90\end{array}$	$\begin{array}{r}6\\ \times 9\\ \hline 54\end{array}$	$\begin{array}{r}8\\ \times 10\\ \hline 80\end{array}$	$\begin{array}{r}9\\ \times 8\\ \hline 72\end{array}$	$\begin{array}{r}4\\ \times 8\\ \hline 32\end{array}$
$\begin{array}{r}3\\ \times 2\\ \hline 6\end{array}$	$\begin{array}{r}9\\ \times 3\\ \hline 27\end{array}$	$\begin{array}{r}3\\ \times 5\\ \hline 15\end{array}$	$\begin{array}{r}3\\ \times 6\\ \hline 18\end{array}$	$\begin{array}{r}5\\ \times 9\\ \hline 45\end{array}$	$\begin{array}{r}5\\ \times 3\\ \hline 15\end{array}$	$\begin{array}{r}5\\ \times 2\\ \hline 10\end{array}$	$\begin{array}{r}9\\ \times 5\\ \hline 45\end{array}$	$\begin{array}{r}7\\ \times 6\\ \hline 42\end{array}$	$\begin{array}{r}10\\ \times 8\\ \hline 80\end{array}$

Homework Packet 7 - Answer Key

Unit 12

Answer Key

Section 12-1

1. B   2. C   3. A   4. D   5. 6
6. 4

Section 12-2

1. B   2. B   3. D   4. C   5. A

Section 12-3

1. A   2. D   3. 395

Section 12-4

1. D   2. B   3. C   4. B   5. 1.04
6. 446

Chapter 12 Practice Test

1. B   2. A   3.C   4. D   5. B
6. C   7. 8485   8. 10   9. 283

Answers and Explanations

Section 12-1

1. B

$g(x) = 1 - x$

$g(-2) = 1 - (-2)$ Substitute -2 for x.

$= 3$

$f(x) = x^2 - 3x - 1$

$f \circ g(-2) = f(g(-2))$

$= f(3)$ $g(-2) = 3$

$= (3)^2 - 3(3) - 1$ Substitute 3 for x.

$= -1$

2. C

$f = \{(-4,12),\ (-2,4),\ (2,0),\ (3,\frac{3}{2})\} \Rightarrow$

$f(-4) = 12$, $f(-2) = 4$, $f(2) = 0$ and $f(3) = \frac{3}{2}$

$g = \{(-2,5),\ (0,1),\ (4,-7),\ (5,-9)\} \Rightarrow$

$g(-2) = 5$, $g(0) = 1$, $g(4) = -7$, $g(5) = -9$

$g \circ f(2) = g(f(2))$

$= g(0)$ $f(2) = 0$

$= 1$ $g(0) = 1$

3. A

$f(g(-1))$

$= f(1)$ $g(-1) = 1$

$= -2$ $f(1) = -2$

4. D

$g(x) = 2 - x$

$g(3) = 2 - 3$ Substitute 3 for x.

$= -1$

$f(g(3))$

$= f(-1)$ $g(3) = -1$

$= \frac{1 - 5(-1)}{2}$ Substitute -1 for x.

$= 3$

5. 6

x	$f(x)$	$g(x)$
-2	-5	0
0	6	4
3	0	-5

Based on the table, $g(-2) = 0$.

$f(g(-2))$

$= f(0)$ $g(-2) = 0$

$= 6$

6. 4

Based on the table, $f(3) = 0$.

$g(f(3))$

$= g(0)$ $f(3) = 0$

$= 4$

Section 12-2

1. B

$a_n = \sqrt{(a_{n-1})^2 + 2}$

$a_1 = \sqrt{(a_0)^2 + 2}$ $n = 1$

$= \sqrt{(\sqrt{2})^2 + 2}$ $a_0 = \sqrt{2}$

$= \sqrt{4} = 2$

Homework Packet 7 - Answer Key

$$a_2 = \sqrt{(a_1)^2 + 2} \qquad n = 2$$
$$= \sqrt{(2)^2 + 2} \qquad a_1 = 2$$
$$= \sqrt{6}$$

2. B

$$a_{n+1} = a_n - \frac{f(a_n)}{g(a_n)}$$
$$a_1 = a_0 - \frac{f(a_0)}{g(a_0)} \qquad n = 0$$
$$= 1 - \frac{f(1)}{g(1)} \qquad a_0 = 1$$

Since $f(x) = x^2 - 3x$ and $g(x) = 2x - 3$,
$f(1) = (1)^2 - 3(1) = -2$ and $g(1) = 2(1) - 3 = -1$.

Thus, $a_1 = 1 - \frac{f(1)}{g(1)} = 1 - \frac{-2}{-1} = -1$.

$$a_2 = a_1 - \frac{f(a_1)}{g(a_1)} \qquad n = 1$$
$$= -1 - \frac{f(-1)}{g(-1)} \qquad a_1 = -1$$

$f(-1) = (-1)^2 - 3(-1) = 4$ and
$g(-1) = 2(-1) - 3 = -5$.

Thus, $a_2 = -1 - \frac{f(-1)}{g(-1)} = -1 - \frac{4}{-5} = -\frac{1}{5}$

3. D

$$f(x) = \sqrt{2x^2 - 1}$$
$$f \circ f \circ f(2)$$
$$= f(f(f(2)) = f(f(\sqrt{2(2)^2 - 1}))$$
$$= f(f(\sqrt{7})) = f(\sqrt{2(\sqrt{7})^2 - 1})$$
$$= f(\sqrt{13}) = \sqrt{2(\sqrt{13})^2 - 1}$$
$$= \sqrt{25} = 5$$

4. C

$$A_n = (1 + \frac{r}{100}) \cdot A_{n-1} + 12b$$
$$A_1 = (1 + \frac{r}{100}) \cdot A_0 + 12b \qquad n = 1$$
$$= (1 + \frac{5}{100}) \cdot 12{,}000 + 12(400)$$
$$= 17{,}400$$

$$A_2 = (1 + \frac{r}{100}) \cdot A_1 + 12b \qquad n = 2$$
$$= (1 + \frac{5}{100}) \cdot 17{,}400 + 12(400) \qquad A_1 = 17{,}400$$
$$= 23{,}070$$
$$A_3 = (1 + \frac{r}{100}) \cdot A_2 + 12b \qquad n = 3$$
$$= (1 + \frac{5}{100}) \cdot 23{,}070 + 12(400) \qquad A_2 = 23{,}070$$
$$= 29{,}023.50$$

5. A

$$P_n = 0.85P_{n-1} + 20$$
$$P_1 = 0.85P_0 + 20 \qquad n = 1$$
$$= 0.85(400) + 20 \qquad P_0 = 400$$
$$= 360$$
$$P_2 = 0.85P_1 + 20 \qquad n = 2$$
$$= 0.85(360) + 20 \qquad P_1 = 360$$
$$= 326$$
$$P_3 = 0.85P_2 + 20 \qquad n = 2$$
$$= 0.85(326) + 20 \qquad P_2 = 326$$
$$= 297.1$$

Section 12-3

1. A

Suppose the initial water level was 100 units.
If the water level decreases by 10 percent each year, the water level will be $100(1-0.1)^n$, or $100(0.9)^n$, n years later. The water level decreases exponentially, not linearly.
Of the graphs shown, only choice A would appropriately model exponential decrease.

2. D

I. At time $t = 0$, the price of model A was \$30,000 and the price of model B was \$24,000. To find out what percent the price of model A was higher than the price of model B, use the following equation.

$$30{,}000 = 24{,}000(\underbrace{1 + \frac{x}{100}}_{x\% \text{ more than}})$$
$$\frac{30{,}000}{24{,}000} = 1 + \frac{x}{100}$$
$$\Rightarrow 1.25 = 1 + \frac{x}{100} \Rightarrow 0.25 = \frac{x}{100}$$
$$\Rightarrow 25 = x$$

Homework Packet 7 - Answer Key

Therefore the price of model A was 25% higher than and the price of model B.

Roman numeral I is true.

To find out what percent the price of model B was less than the price of model A, use the following equation.

$$24,000 = 30,000(1 \underbrace{- \frac{x}{100}}_{x\% \text{ less than}})$$

$$\frac{24,000}{30,000} = 1 - \frac{x}{100}$$

$$0.8 = 1 - \frac{x}{100} \Rightarrow 0.2 = \frac{x}{100}$$

$$\Rightarrow 20 = x$$

Therefore the price of model B was 20% less than the price of model A.

Roman numeral II is true.

From time $t = 0$ to $t = 6$, the average rate of decrease in the value of model A

$$= \frac{\text{amount of decrease}}{\text{change in years}} = \frac{30,000 - 12,000}{6}$$

$$= 3,000$$

From time $t = 0$ to $t = 6$, the average rate of decrease in the value of model B

$$= \frac{\text{amount of decrease}}{\text{change in years}} = \frac{24,000 - 12,000}{6}$$

$$= 2,000$$

Therefore, from time $t = 0$ to $t = 6$, the average rate of decrease in the value of model A was 1.5 times the average rate of decrease in the value of model B.

Roman numeral III is also true.

Choice D is correct.

3. 395

$$f(x) = 12,000(0.9)^x \text{ and } g(x) = 14,000(0.85)^x$$

$$g(2) - f(2) = 14,000(0.85)^2 - 12,000(0.9)^2$$

$$= 10,115 - 9720 = 395$$

Section 12-4

1. D

The present population must be multiplied by a factor of 2 to double. If a certain population doubles every 40 days, the population grows by a multiple of $(2)^{\frac{1}{40}}$ each day. After t days, the population will be multiplied by $(2)^{\frac{t}{40}}$. If the population starts with 12 rabbits, after t days, the population will be $12 \times (2)^{\frac{t}{40}}$.

2. B

For the present population to decrease by 4%, the initial population must be multiplied by a factor of 0.96. If population P is 80,000 this year, it will be
$80,000(0.96)$ one year later,
$80,000(0.96)(0.96)$ two years later,
$80,000(0.96)(0.96)(0.96)$ three years later,
and so on. After t years, the population will be $80,000(0.96)^t$.

3. C

For the price of a house to increase at an annual growth rate of r, it must be multiplied by a factor of $(1+r)$ each year. If the price of the house is \$150,000 this year, it will be
$150,000(1+r)$ one year later,
$150,000(1+r)(1+r)$ two years later,
$150,000(1+r)(1+r)(1+r)$ three years later,
and so on. Thus, 10 years later, the price of the house will be $150,000(1+r)^{10}$.

4. B

If the half-life of a substance is 12 days, half of the substance decays every 12 days.
Make a chart.

Amount	Days
128	0
$128 \times \frac{1}{2}$	12 days after
$128 \times \frac{1}{2} \times \frac{1}{2}$	24 days after
$128 \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$	36 days after
$128 \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$	48 days after

Therefore, after 48 days, there will be $128 \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$, or 8 milligrams, of the radioactive substance left.

Homework Packet 7 - Answer Key

5. 1.04

The initial deposit earns 4 percent interest compounded annually. Thus at the end of one year, the new value of the account is the initial deposit of \$3,000 plus 4 percent of the initial deposit: $\$3,000 + 0.04(\$3,000) = \$3,000(1+0.04)$.
Since the interest is compounded annually, the value at the end of each succeeding year is the previous year's value plus 4 percent of the previous year's value. Thus after 2 years, the value will be $\$3,000(1.04)(1.04)$. After 3 years, the value will be $\$3,000(1.04)(1.04)(1.04)$.
After t years, the value will be $\$3,000(1.04)^t$.
Therefore, the value of x in the expression $\$3,000(x)^t$ is 1.04.

6. 446

The difference in the amount after 10 years will be
$\$3,000(1.05)^{10} - \$3,000(1.04)^{10}$
$\approx \$445.95$.
To the nearest dollar the difference in the amount will be \$446.

Chapter 12 Practice Test

1. B

$f(x) = \sqrt{2x}$ and $g(x) = 2x^2$
$g(1) = 2(1)^2 = 2$ and $f(1) = \sqrt{2(1)} = \sqrt{2}$
$f(g(1)) - g(f(1))$
$= f(2) - g(\sqrt{2})$
$= \sqrt{2(2)} - 2(\sqrt{2})^2$
$= \sqrt{4} - 2(2) = 2 - 4 = -2$

2. A

$f(x) = \sqrt{625 - x^2}$ and $g(x) = \sqrt{225 - x^2}$
$f(5) = \sqrt{625 - 5^2} = \sqrt{600}$
$g(5) = \sqrt{225 - 5^2} = \sqrt{200}$
$f(f(5)) - g((g5))$
$= f(\sqrt{600}) - g(\sqrt{200})$
$= (\sqrt{625 - (\sqrt{600})^2}) - (\sqrt{225 - (\sqrt{200})^2})$
$= \sqrt{625 - 600} - \sqrt{225 - 200}$
$= \sqrt{25} - \sqrt{25} = 0$

3. C

Method I:

You can keep dividing by 2 until you get to a population of 6,400.

Year	Population
1980	51,200
1955	25,600
1930	12,800
1905	6,400

Method II:

Use the half-life formula, $A = P(\frac{1}{2})^{t/d}$.

$6,400 = 51,200(\frac{1}{2})^{t/25}$

$\frac{6,400}{51,200} = (\frac{1}{2})^{t/25}$ Divide each side by 51,200.

$\frac{1}{8} = (\frac{1}{2})^{t/25}$ Simplify.

$(\frac{1}{2})^3 = (\frac{1}{2})^{t/25}$ $\frac{1}{8} = (\frac{1}{2})^3$

$3 = \frac{t}{25}$ If $b^x = b^y$, then $x = y$.

$75 = t$

Therefore, in year $1980 - 75$, or 1905, the population of the town was 6,400.

4. D

The table shows that one-half of the substance decays every 28 years. Therefore, the half-life of the radioactive substance is 28 years. Use the half-life formula, $A = P(\frac{1}{2})^{t/d}$, to find out how much of the original amount of the substance will remain after 140 years. P is the initial amount, t is the number of years and d is the half-life.

$A = 1,200(\frac{1}{2})^{140/28}$

$= 37.5$ Use a calculator.

To the nearest gram, 38 grams of the substance will remain after 140 years.

5. B

If the substance decays at a rate of 18% per year the amount of substance remaining each year will be multiplied by $(1-0.18)$, or 0.82.
The initial amount of 100 grams will become

Homework Packet 7 - Answer Key

$100(1-0.18)$ one year later,
$100(1-0.18)(1-0.18)$ two years later,
$100(1-0.18)(1-0.18)(1-0.18)$ three years later,
and so on. Thus, t years later, the remaining amount of the substance, in grams, is
$f(t)=100(0.82)^t$.

6. C

$5,000(1+\frac{r}{100})^t$
The value of the 15 year investment at 6% annual compound interest
$=5,000(1+\frac{6}{100})^{15}=5,000(1.06)^{15}$.
The value of the 12 year investment at 6% annual compound interest
$=5,000(1+\frac{6}{100})^{12}=5,000(1.06)^{12}$.
The difference is
$=5,000(1.06)^{15}-5,000(1.06)^{12}$
$=5,000\left[(1.06)^{15}-(1.06)^{12}\right]$

7. 8485

$P(t)=24,000(\frac{1}{2})^{\frac{t}{6}}$

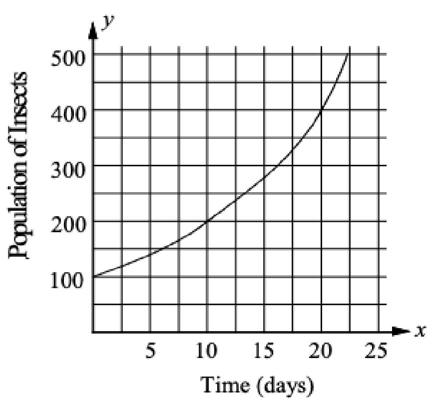
$P(9)=24,000(\frac{1}{2})^{\frac{9}{6}}$ Substitute 9 for t.

$=24,000(\frac{1}{2})^{\frac{3}{2}}$

$\approx 8,485.28$ Use a calculator.

To the nearest dollar, the price of the truck 9 years after it was purchased is \$8,485.

8. 10



$f(t)=100(2)^{\frac{t}{d}}$

In the equation, d represents the amount of time it takes to double the population. The graph shows that the population was 100 at $t=0$, 200 at $t=10$, and 400 at $t=20$. Therefore, the value of doubling time d is 10 days.

9. 283

$f(t)=100(2)^{\frac{t}{d}}$

$f(15)=100(2)^{\frac{15}{10}}=100(2)^{1.5}$

≈ 282.84 Use a calculator.

The population of the insect after 15 days was 283, to the nearest whole number.

Homework Packet 7 - Answer Key

Unit 13

Answer Key

Section 13-1

1. D	2. C	3. A	4. B	5. B

Section 13-2

1. A	2. C	3. D	4. B	5. 8
6. 3				

Section 13-3

1. B	2. C	3. B	4. A	5. D
6. D				

Section 13-4

1. B	2. A	3. B	4. C	5. $\frac{5}{9}$
6. 2				

Section 13-5

1. B	2. C	3. D	4. C	5. 23
6. 2				

Chapter 13 Practice Test

1. C	2. D	3. B	4. A	5. C
6. B	7. B	8. D	9. C	10. D

Answers and Explanations

Section 13-1

1. D

$f(x) = ax^3 + x^2 - 18x - 9$

If point $(3,0)$ lies on the graph of f, substitute 0 for f and 3 for x.

$0 = a(3)^3 + (3)^2 - 18(3) - 9$.

$0 = 27a - 54$

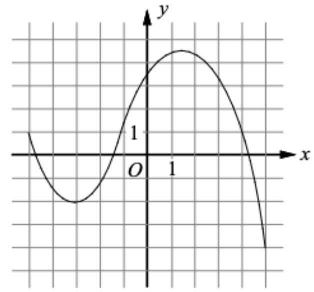
$2 = a$

2. C

If the graph of a polynomial function f has an x-intercept at a, then $(x-a)$ is a factor of $f(x)$. Since the graph of function f has x-intercepts at -7, -5, and 5, $(x+7)$, $(x+5)$, and $(x-5)$ must each be a factor of $f(x)$. Therefore,

$f(x) = (x+7)(x+5)(x-5) = (x+7)(x^2-5)$.

3. A

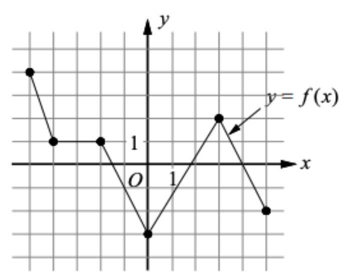


The minimum value of a graphed function is the minimum y-value of all the points on the graph. For the graph shown, when $x = -3$, $y = -2$ and when $x = 5$, $y = -4$, so the minimum is at $(5,-4)$ and the minimum value is -4.

4. B

A zero of a function corresponds to an x-intercept of the graph of the function on the xy-plane. Only the graph in choice B has four x-intercepts. Therefore, it has the four distinct zeros of function f.

5. B



I. f is not strictly decreasing for $-5 < x < 0$, because on the interval $-4 < x < -2$, f is not decreasing.

Roman numeral I is not true.

II. The coordinates $(-3,1)$ is on the graph of f, therefore, $f(-3) = 1$

Roman numeral II is true.

III. For the graph shown, when $x = 0$, $y = -3$ and when $x = 5$, $y = -2$, so f is minimum at $x = 0$.

Roman numeral III is not true.

Homework Packet 7 - Answer Key

Section 13-2

1. A

If -1 and 1 are two real roots of the polynomial function, then $f(-1)=0$ and $f(1)=0$. Thus

$f(-1)=a(-1)^3+b(-1)^2+c(-1)+d=0$ and

$f(1)=a(1)^3+b(1)^2+c(1)+d=0$.

Simplify the two equations and add them to each other.

$$\begin{array}{rl} & -a+b-c+d=0 \\ + & \underline{\;a+b+c+d=0\;} \\ & 2b\quad+2d=0 \text{ or } b+d=0. \end{array}$$

Also $f(0)=3$, since the graph of the polynomial passes through $(0,3)$.

$f(0)=a(0)^3+b(0)^2+c(0)+d=3$ implies $d=3$.

Substituting $d=3$ in the equation $b+d=0$ gives $b+3=0$, or $b=-3$.

2. C

If polynomial $p(x)=81x^5-121x^3-36$ is divided by $x+1$, the remainder is $p(-1)$.

$p(-1)=81(-1)^5-121(-1)^3-36=4$

The remainder is 4.

3. D

If $x-2$ is a factor for polynomial $p(x)$, then $p(2)=0$.

$p(x)=a(x^3-2x)+b(x^2-5)$

$p(2)=a(2^3-2(2))+b(2^2-5)$

$=a(8-4)+b(4-5)$

$=4a-b=0$

4. B

If $(x-a)$ is a factor of $f(x)$, then $f(a)$ must be equal to 0. Based on the table, $f(-3)=0$.

Therefore, $x+3$ must be a factor of $f(x)$.

5. 8

$x^3-8x^2+3x-24=0$	
$(x^3-8x^2)+(3x-24)=0$	Group terms.
$x^2(x-8)+3(x-8)=0$	Factor out the GCF.
$(x^2+3)(x-8)=0$	Distributive Property
$x^2+3=0$ or $x-8=0$	Solutions

Since $x^2+3=0$ does not have a real solution, $x-8=0$, or $x=8$, is the only solution that makes the equation true.

6. 3

$x^4-8x^2=9$	
$x^4-8x^2-9=0$	Make one side 0.
$(x^2-9)(x^2+1)=0$	Factor.
$(x+3)(x-3)(x^2+1)=0$	Factor.

Since $x^2+1=0$ does not have a real solution, the solutions for x are $x=-3$ and $x=3$. Since it is given that $x>0$, $x=3$ is the only solution to the equation.

Section 13-3

1. B

$$a^{-\frac{1}{2}}=\frac{1}{a^{\frac{1}{2}}}=\frac{1}{\sqrt{a}}$$

2. C

$\dfrac{1}{3-2\sqrt{2}}$	
$=\dfrac{1}{3-2\sqrt{2}}\cdot\dfrac{3+2\sqrt{2}}{3+2\sqrt{2}}$	Multiply the conjugate of of the denominator.
$=\dfrac{3+2\sqrt{2}}{(3)^2-(2\sqrt{2})^2}$	$(a-b)(a+b)=a^2-b^2$
$=\dfrac{3+2\sqrt{2}}{9-8}$	Simplify.
$=3+2\sqrt{2}$	

3. B

$(x+1)^3=-64$	
$x+1=\sqrt[3]{-64}$	Definition of cube root.
$x+1=-4$	$\sqrt[3]{-64}=(-64)^{\frac{1}{3}}=-4$
$x=-5$	Subtract 1 from each side.

4. A

$\sqrt{8}+\sqrt{18}-\sqrt{32}$

$=\sqrt{4}\sqrt{2}+\sqrt{9}\sqrt{2}-\sqrt{16}\sqrt{2}$

$=2\sqrt{2}+3\sqrt{2}-4\sqrt{2}$

$=\sqrt{2}$

Homework Packet 7 - Answer Key

5. D

$(1+\sqrt{3})(2-\sqrt{3})$

$=2-\sqrt{3}+2\sqrt{3}-\sqrt{3}\sqrt{3}$ FOIL

$=2+\sqrt{3}-3$ Combine like radicals.

$=-1+\sqrt{3}$ Simplify.

6. D

$b^{\frac{5}{3}}=b^1\cdot b^{\frac{2}{3}}=b\cdot(b^2)^{\frac{1}{3}}=b\cdot\sqrt[3]{b^2}$

Section 13-4

1. B

$11-\sqrt{2x+3}=8$

$11-\sqrt{2x+3}-11=8-11$ Subtract 11 from each side.

$-\sqrt{2x+3}=-3$ Simplify.

$(-\sqrt{2x+3})^2=(-3)^2$ Square each side.

$2x+3=9$ Simplify.

$2x=6$ Subtract 3 from each side.

$x=3$ Divide each side by 2.

2. A

$\sqrt{-3x+4}=7$

$(\sqrt{-3x+4})^2=(7)^2$ Square each side.

$-3x+4=49$ Simplify.

$-3x=45$ Subtract 4 from each side.

$x=-15$ Divide each side by -3.

3. B

$\sqrt{x+18}=x-2$

$(\sqrt{x+18})^2=(x-2)^2$ Square each side.

$x+18=x^2-4x+4$ Simplify.

$0=x^2-5x-14$ Make one side 0.

$0=(x-7)(x+2)$ Factor.

$0=x-7$ or $0=x+2$ Zero Product Property

$7=x$ or $-2=x$

Check each x-value in the original equation.

$\sqrt{7+18}=7-2$ $x=7$

$\sqrt{25}=5$ Simplify.

$5=5$ True

$\sqrt{-2+18}=-2-2$ $x=-2$

$\sqrt{16}=-4$ Simplify.

$4=-4$ False

Thus, 7 is the only solution.

4. C

$\sqrt{5x-12}=3\sqrt{2}$

$(\sqrt{5x-12})^2=(3\sqrt{2})^2$ Square each side.

$5x-12=18$ Simplify.

$5x=30$ Add 12 to each side.

$x=6$ Divide by 5 on each side.

5. $\frac{5}{9}$

$\sqrt{2-3x}=\frac{1}{3}a$

$\sqrt{2-3x}=\frac{1}{3}\sqrt{3}$ $a=\sqrt{3}$

$(\sqrt{2-3x})^2=(\frac{1}{3}\sqrt{3})^2$ Square each side.

$2-3x=\frac{1}{3}$ Simplify.

$-3x=-\frac{5}{3}$ Subtract 2 from each side.

$-\frac{1}{3}(-3x)=-\frac{1}{3}(-\frac{5}{3})$ Multiply each side by $-\frac{1}{3}$.

$x=\frac{5}{9}$ Simplify.

6. 2

$\sqrt[3]{x-k}=-2$

$(\sqrt[3]{x-k})^3=(-2)^3$ Cube each side.

$x-k=-8$ Simplify.

$x-(8-\sqrt{2})=-8$ $k=8-\sqrt{2}$

$x-8+\sqrt{2}=-8$ Simplify.

$x+\sqrt{2}=0$ Add 8 to each side.

$x=-\sqrt{2}$ Subtract $\sqrt{2}$.

$(x)^2=(-\sqrt{2})^2$ Square each side.

$x^2=2$ Simplify.

Section 13-5

1. B

$\sqrt{-1}-\sqrt{-4}+\sqrt{-9}$

$=i-i\sqrt{4}+i\sqrt{9}$ $i=\sqrt{-1}$

$=i-2i+3i$

$=2i$

Homework Packet 7 - Answer Key

2. C

$$\sqrt{-2}\cdot\sqrt{-8}$$
$$=i\sqrt{2}\cdot i\sqrt{8} \qquad \sqrt{-2}=i\sqrt{2},\ \sqrt{-8}=i\sqrt{8}$$
$$=i^2\sqrt{16}$$
$$=-4 \qquad i^2=-1$$

3. D

$$\frac{3-i}{3+i}$$
$$=\frac{3-i}{3+i}\cdot\frac{3-i}{3-i} \qquad \text{Rationalize the denominator.}$$
$$=\frac{9-6i+i^2}{9-i^2} \qquad \text{FOIL}$$
$$=\frac{9-6i-1}{9+1} \qquad i^2=-1$$
$$=\frac{8-6i}{10} \qquad \text{Simplify.}$$
$$=\frac{4-3i}{5} \text{ or } \frac{4}{5}-\frac{3i}{5}$$

4 . C

$$\frac{1}{2}(5i-3)-\frac{1}{3}(4i+5)$$
$$=\frac{5}{2}i-\frac{3}{2}-\frac{4i}{3}-\frac{5}{3} \qquad \text{Distributive Property}$$
$$=\frac{15}{6}i-\frac{9}{6}-\frac{8i}{6}-\frac{10}{6} \qquad \text{6 is the GCD.}$$
$$=\frac{7}{6}i-\frac{19}{6} \qquad \text{Simplify.}$$

5. 23

$$(4+i)^2=a+bi$$
$$16+8i+i^2=a+bi \qquad \text{FOIL}$$
$$16+8i-1=a+bi \qquad i^2=-1$$
$$15+8i=a+bi \qquad \text{Simplify.}$$
$$15=a \text{ and } 8=b \qquad \text{Definition of Equal Complex Numbers}$$

Therefore, $a+b=15+8=23$.

6. 2

$$\frac{3-i}{1-2i}=\frac{3-i}{1-2i}\cdot\frac{1+2i}{1+2i}=\frac{3+6i-i-2i^2}{1-4i^2}$$
$$=\frac{3+6i-i+2}{1+4}=\frac{5+5i}{5}=1+i=a+bi$$

Therefore, $a=1$ and $b=1$, and $a+b=1+1=2$.

Chapter 13 Practice Test

1. C

$f(x)=2x^3+bx^2+4x-4$

$f(\frac{1}{2})=0$ because the graph of f intersects the x-axis at $(\frac{1}{2},0)$.

$f(\frac{1}{2})=2(\frac{1}{2})^3+b(\frac{1}{2})^2+4(\frac{1}{2})-4=0$

Solving the equation for b gives $b=7$.

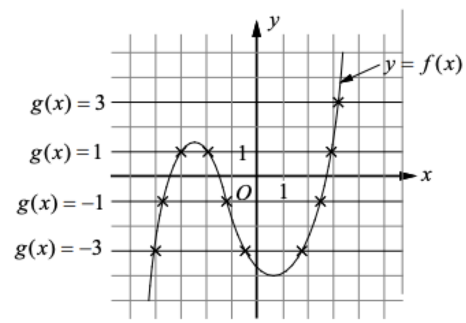
Thus $f(x)=2x^3+7x^2+4x-4$.

Also $k=f(-2)$, because $(-2,k)$ lies on the graph of f.

$k=f(-2)=2(-2)^3+7(-2)^2+4(-2)-4$

Solving the equation for k gives $k=0$.

2. D



$g(x)=-3$ has 3 points of intersection with $y=f(x)$, so there are 3 real solutions.

$g(x)=-1$ has 3 points of intersection with $y=f(x)$, so there are 3 real solutions.

$g(x)=1$ has 3 points of intersection with $y=f(x)$, so there are 3 real solutions.

$g(x)=3$ has 1 point of intersection with $y=f(x)$, so there is 1 real solution.

Choice D is correct

3. B

If $x+2$ is a factor of $f(x)=-(x^3+3x^2)-4(x-a)$, then $f(-2)=0$.

$f(-2)=-((-2)^3+3(-2)^2)-4(-2-a)=0$

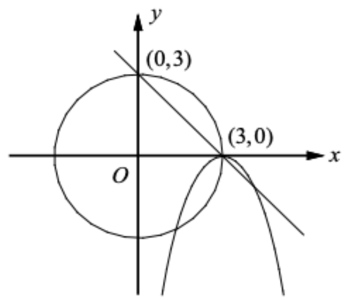
$-(-8+12)+8+4a=0$

$4+4a=0$

$a=-1$

Homework Packet 7 - Answer Key

4. A



The solutions to the system of equations are the points where the circle, parabola, and line all intersect. That point is $(3,0)$ and is therefore the only solution to the system.

5. C

$\frac{(1-i)^2}{1+i}$

$=\frac{1-2i+i^2}{1+i}$ FOIL the numerator.

$=\frac{1-2i-1}{1+i}$ $i^2=-1$

$=\frac{-2i}{1+i}$ Simplify.

$=\frac{-2i}{1+i}\cdot\frac{1-i}{1-i}$ Rationalize the denominator.

$=\frac{-2i+2i^2}{1-i^2}$ FOIL

$=\frac{-2i-2}{2}$ $i^2=-1$

$=-i-1$

6. B

$a\sqrt[3]{a}=a\cdot a^{\frac{1}{3}}=a^{1+\frac{1}{3}}=a^{\frac{4}{3}}$

7. B

$p(x)=-2x^3+4x^2-10x$

$q(x)=x^2-2x+5$

In $p(x)$, factoring out the GCF, $-2x$, yields

$p(x)=-2x(x^2-2x+5)=-2x\cdot q(x)$.

Let's check each answer choice.

A) $f(x)=p(x)-\frac{1}{2}q(x)$

$=-2x\cdot q(x)-\frac{1}{2}q(x)=(-2x-\frac{1}{2})q(x)$

$q(x)$ is not a factor of $x-1$ and $(-2x-\frac{1}{2})$ is not a factor of $x-1$. $f(x)$ is not divisible by $x-1$.

B) $g(x)=-\frac{1}{2}p(x)-q(x)$

$=-\frac{1}{2}[-2x\cdot q(x)]-q(x)=(x-1)q(x)$

Since $g(x)$ is $x-1$ times $q(x)$, $g(x)$ is divisible by $x-1$.

Choices C and D are incorrect because $x-1$ is not a factor of the polynomials $h(x)$ and $k(x)$.

8. D

$\sqrt{2x+6}=x+3$

$(\sqrt{2x+6})^2=(x+3)^2$ Square each side.

$2x+6=x^2+6x+9$ Simplify.

$x^2+4x+3=0$ Make one side 0.

$(x+1)(x+3)=0$ Factor.

$x+1=0$ or $x+3=0$ Zero Product Property

$x=-1$ or $x=-3$

Check each x-value in the original equation.

$\sqrt{2(-1)+6}=-1+3$ $x=-1$

$\sqrt{4}=2$ Simplify.

$2=2$ True

$\sqrt{2(-3)+6}=-3+3$ $x=-3$

$0=0$ True

Thus, -1 and -3 are both solutions to the equation.

9. C

Use the remainder theorem.

$p(\frac{1}{2})=24(\frac{1}{2})^3-36(\frac{1}{2})^2+14=8$

Therefore, the remainder of polynomial $p(x)=24x^3-36x^2+14$ divided by $x-\frac{1}{2}$ is 8.

10. D

If $(x-a)$ is a factor of $f(x)$, then $f(a)$ must equal to 0. Thus, if $x+2$, $x+1$ and $x-1$ are factors of f, we have $f(-2)=f(-1)=f(1)=0$.

Choice D is correct.