Name: Answer Key

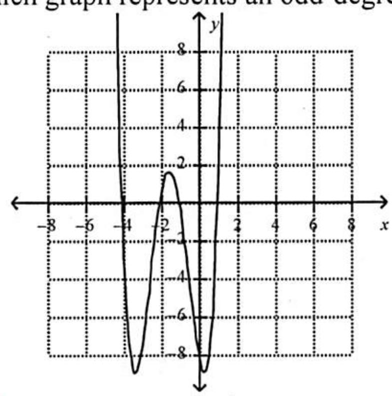
35

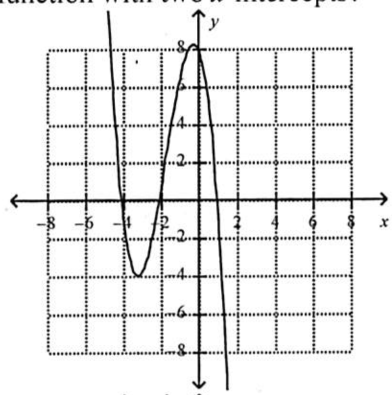
Precalc 12

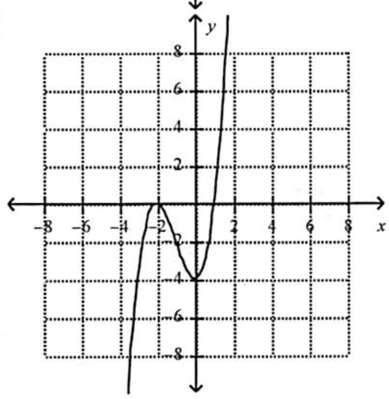
Chapter 3 TEST

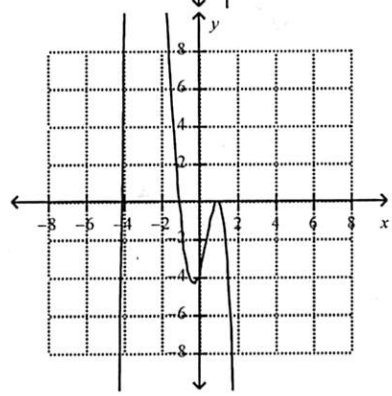
Multiple Choice
Identify the choice that best completes the statement or answers the question.

B **1.** Which graph represents an odd-degree polynomial function with two x-intercepts?

A


C


B


D


C **2.** How many x-intercepts are possible for the polynomial function $h(x) = ax^5 + bx^4 + cx^3$? $= x^3(ax^2 + bx + c)$

A 4 C 3

B 5 D 1

0

C **3.** What is the remainder when $x^4 - 8x^2 + 9x + 8$ is divided by $x + 6$?

A 1070 C 962

B −1070 D −962

D **4.** For a polynomial $P(x)$, if $P(6) = 0$, then which of the following must be a factor of $P(x)$?

A $x^2 - 6$ C $x^2 + 6$

B $x + 6$ D $x - 6$

A **5.** A factor of $x^3 + 16x^2 + 79x + 120$ is

A $x + 3$ C $x - 3$

B $x - 5$ D $x - 8$

C **6.** Determine the value of k so that $x + 2$ is a factor of $x^3 + 10x^2 + 23x + k$.

A $k = -1$ C $k = 14$

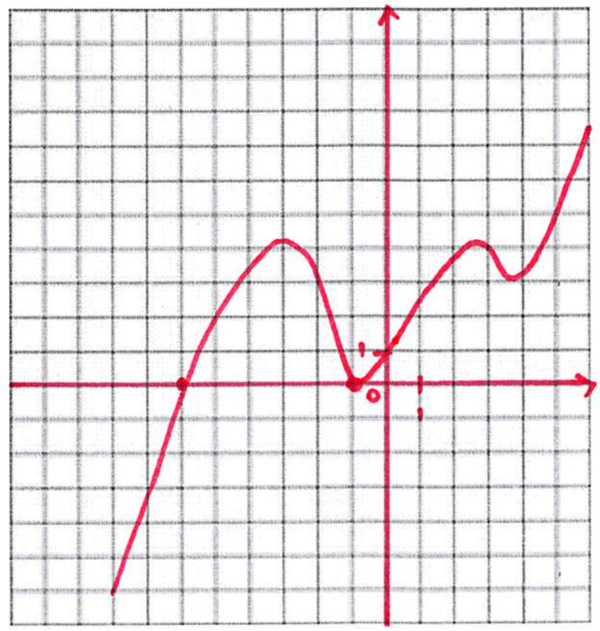
B $k = -14$ D $k = 1$

6

Name: ______________________________ **Precalc 12**

Short Answer

____ **7.** Graph a possible <u>degree 5</u> polynomial function with zeros -6 (multiplicity of 1) and -1 (multiplicity of 2):



2
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8. Show that $x + 1$ is a factor of $P(x) = x^3 + 2x^2 + 3x + 2$.

$P(-1) = 0$

1
___

9. Factor fully.

a) $4x^3 - 11x^2 - 3x = x(4x^2 - 11x - 3)$

$= x(4x + 1)(x - 3)$

$\otimes -12$ $\oplus -11$ $\}$ -12 & 1

2
___

b) $x^4 - 81 = (x+3)(x-3)(x^2+9)$

2
___

10. Solve by factoring.
$8x^3 - 6x^2 - 23x + 6 = 0$

$(x-2)(8x^2+10x-3)=0$

$(x-2)(2x+3)(4x-1)=0$

3 $x=2$ or $x=-\frac{3}{2}$ or $x=\frac{1}{4}$

11. Consider the polynomial $P(x) = x^3 + 3x^2 - x - 3$.

a) What is the general shape of its graph (without any calculation and without looking at your calculator). You don't need to be precise!

1

b) If the polynomial could be factored by $(x - a)$, what are the possible values of a that you could consider?

1 ± 3 and ± 1

c) Determine the x-intercepts and the y-intercept of this graph.

$P(x) = (x-1)(x+1)(x+3)$

2 x-intercepts: $-3, -1$ and 1 y-intercept: -3

d) Determine the intervals where the polynomial is positive.

$[-3;-1]$ and $[1,+\infty)$

2 $-3<x<-1$ & $x>1$

x		-3		-1		1	
$P(x)$	-	0	+	0	-	0	+

Name: ______________________ **Precalc 12**

12. Divide the following polynomials and express your answer appropriately.
a) $2x^3 + x^2 - 2x + 1$ by $(x+1)$ using synthetic division

2 3

-1	2	1	-2	1
$+$	$\downarrow$	-2	$+1$	$+1$
$\times$	2	-1	-1	2

$$\frac{2x^3+x^2-2x+1}{x+1} = 2x^2 - x - 1 + \frac{2}{x+1}$$

b) $-8x^4 + 10x^3 - 4x + 15$ by $(x-3)$ using long division

3

$$\begin{array}{r} -8x^3-14x^2-42x-130 \\ x-3\overline{)\,-8x^4+10x^3-4x+15} \\ -8x^4+24x^3 \\ \hline -14x^3+0x^2 \\ -14x^3+42x^2 \\ \hline -42x^2-4x \\ -42x^2+126x \\ \hline -130x+15 \quad R:-375 \end{array}$$

$$\frac{-8x^4+10x^3-4x+15}{x-3} = -8x^3-14x^2-42x-130 - \frac{375}{x-3}$$

Problems

13. The height, h, in metres, of a weather balloon above the ground after t seconds can be modelled by the function $h(t) = -2t^3 + 3t^2 + 149t + 410$, for $0 \le t \le 10$. When is the balloon exactly 980 m above the ground?

2 3

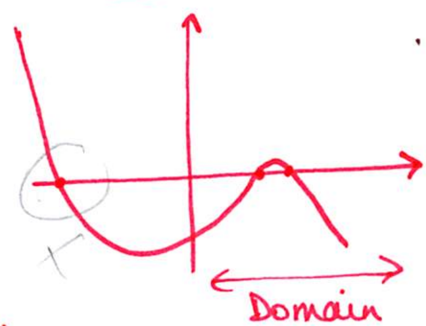
$980 = -2t^3 + 3t^2 + 149t + 410$

$-2t^3 + 3t^2 + 149t - 570 = 0$

$-(t-6)(t-5)(2t+19) = 0$

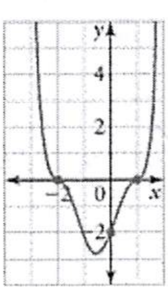
$t = 6$ or $t = 5$ or $t = -\frac{19}{2}$

On the 5th and 6th seconds.



14. Determine an equation in factored form for the polynomial functions represented by the following graphs:

4

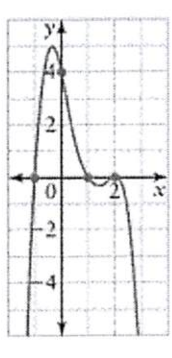


$y = a(x+2)^3(x-1)^3$

$-2 = a(0+2)^3(0-1)^3$

$a = \frac{1}{4}$

$\boxed{y = \frac{1}{4}(x+2)^3(x-1)^3}$



$y = a(x+1)(x-1)(x-2)^2$

$4 = a(0+1)(0-1)(0-2)^2$

$a = -1$

$\boxed{y = -(x+1)(x-1)(x-2)^2}$