Multiple-Choice Questions

1. Which binomial is not a factor of $2x^4 + 3x^3 - 12x^2 - 7x + 6$?

A. $x - 2$ **B.** $x + 3$

C. $x - 1$ **D.** $x + 1$

2. Which product of factors is equal to $x^3 - 8x^2 + x + 42$?

A. $(x + 2)(x - 7)(x - 3)$ **B.** $(x - 2)(x + 7)(x - 3)$

C. $(x - 2)(x - 7)(x + 3)$ **D.** $(x + 2)(x + 7)(x + 3)$

Study Note

How are the remainder theorem and factor theorem related?

The remainder theorem is used to determine the remainder when a polynomial is divided by a binomial of the form $x - a$, without dividing. For example, if the polynomial is $P(x)$, and $P(4) = 3$, then the remainder when $P(x)$ is divided by $x - 4$ is 3.

The factor theorem is a special case of the remainder theorem when the remainder is 0. The factor theorem can be used to determine the binomial factors of a polynomial without dividing. For example, if the polynomial is $P(x)$, and $P(2) = 0$, then $x - 2$ is a factor of $P(x)$ because the remainder is 0.

TEACHER NOTE

Solution strategy: Each binomial has the form $x - a$. Identify each value of a, then evaluate the polynomial for that value to determine which product of factors has 0 remainder for each of its 3 factors.

Additional Workspace

ANSWERS

Check Your Understanding

1. a) 0 **b)** 45 **2. a)** yes **b)** yes **c)** yes **d)** no

3. $3x^3 - 4x^2 - 5x + 2 = (x + 1)(x - 2)(3x - 1)$

Exercises

3. a) -4 **b)** 1 **c)** -11 **d)** 7 **4. a) i)** 0 **ii)** -32 **iii)** 0 **iv)** -12

b) $x - 1$ and $x + 2$ **5.** $\pm1, \pm2, \pm4, \pm8, \pm16$ **6. a) i)** 1 **ii)** 0 **iii)** 2 **iv)** 4

7. a) 52 **b)** 14 **8.** $k = -2$ **9. a)** $x + 2, x - 2$, or $x + 3$

b) $x - 1, x + 1, x - 2, x + 2$, or $x + 3$ **10. b)** $x + 2$ and $x - 3$

11. a) $(x - 1)(x + 2)(x + 5)$ **b)** $(x - 1)(x + 1)(x - 2)(x + 2)$

12. a) $b = -1$ **b)** $d = -5$ **13.** yes **14.** $m = -1; n = -4$ **15. a)** 5 **b)** 3

Multiple Choice

1. C **2.** A