

Chapter 1: Factoring Polynomials

Lesson 4: Advanced Factoring

⑧ Question #1: Determining Missing Factor

Reference Q.14755

Complete the following by determining the missing factor.

a. $x^2 - 36 = (x - 6)(\quad)$

b. $c^2 - 121 = (c + 11)(\quad)$

c. $j^2 - k^2 = (j - k)(\quad)$

⑧ Question #2: Factoring Polynomials

Reference Q.14756

Factor the following polynomials using a difference of squares.

a. $x^2 - 49$

b. $x^2 - 1$

c. $x^2 - 15^2$

d. $x^2 - 400$

⑧ Question #3: Written Response

Reference Q.14757

Explain how factoring a difference of squares in one variable can be regarded as a special case of factoring trinomials by inspection.

⑧ Question #4: Factoring Polynomials

Reference Q.14758

Factor where possible.

a. $m^2 - n^2$

b. $c^2 - 7^2$

c. $1 - k^2$

d. $g^2 - 64h^2$

e. $25x^2 - 144$

f. $16a^2 - 9b^2$

g. $4x^2 + z^2$

h. $121a^2 - 36b^2$

i. $49 - 4h$

j. $100 - 81b^2$

k. $1 - 25z^2$

l. $225a^2 - b^2$

m. $169z^2 - 4q^2$

n. $256 - y^2$

o. $t^2 + 36z^2$

p. $49a^2 - 400$

⑧ Question #5: Factoring Polynomials

Reference Q.14760

Factor.

a. $8x^2 - 32$

b. $4a^2 - 100y^2$

c. $3t^2 + 27s^2$

d. $7x^2 - 7y^2$

e. $9a^2b^2 - 36$

f. $8 - 50p^2q^2$

g. $xy^2 - x^3$

h. $20a^2b^2 - 5a^4b^4$

⑧ Question #6: Factoring Polynomials

Reference Q.14761

Factor.

a. $a^2b^2 - 9$

b. $c^2 - d^2e^2$

c. $100x^2 - y^2z^2$

d. $p^2q^2 - r^2s^2$

e. $25x^2y^2 - 1$

f. $c^2d^2 - 4f^2$

g. $4x^2a^2 - 49z^2t^2$

h. $16a^2c^2 - 225b^2d^2$

⑧ Question #7: Finding Unknown Variables

Reference Q.14965

Consider the following in which each letter represents a whole number.

a. $64x^2 - y^2 = (Hx - y)(Hx + y)$

b. $16x^2 - 4 = C(Ix + 1)(Ix - 1)$

c. $7x^2 - 252y^2 = P(x - Ey)(x + Ey)$

d. $Lx^2 - Ny^2 = (3x - 5y)(Sx + Ay)$

Determine the value of each letter and hence name the country represented by the following code.

(4) (8) (2) (9) (6)

⑧ Question #8: Factor of an Expression

Reference Q.14967

One factor of $16 - 4m^2$ is

A. $4 - m$

B. $8 - 2m$

C. $4 + m$

D. $2 + m$

Ⓢ **Question #9: Evaluating an Equation**

Reference Q.14969

$3x + 2y$ is a factor of the binomial $a^2x^2 - b^2y^2$.

The value of $a^2 + b^2$ is ____.

Ⓢ **Question #10: Determine The Values Of The Variables**

Reference Q.15056

The expression $15x^2 + 11x - 56$ can be written in the form $(ax-b)(cx+d)$ where a, b, c , and d are all positive integers. Determine the values of a, b, c , and d .

Ⓢ **Question #11: Factoring**

Reference Q.15068

One factor of $x^4 - 16x^2 + 15$ is

- A. $x + 1$
- B. $x^2 + 15$
- C. $x + 15$
- D. $x - 15$

Ⓢ **Question #12: Factoring**

Reference Q.15059

Factor.

- a. $x^4 - y^4$
- b. $a^4 - 256b^4$
- c. $2z^4 - 162$
- d. $48x^4 - 3y^4$
- e. $9a^4b^4 - 144c^4d^4$
- f. $z^8 - 1$

Ⓢ **Question #13: Factoring Quadratics**

Reference Q.19112

Factor: $(2x+3y)^2 - 121$.

Ⓢ **Question #14: Factoring Quadratics**

Reference Q.19113

Factor: $144 - (-7x+y)^2$.

Ⓢ **Question #15: Factor**

Reference Q.15074

Factor.

- a. $x^2 - 49$
- b. $x^2 - 8x + 15$
- c. $8x^2 + 32$
- d. $2p^2 - 5p - 7$
- e. $v^2 + 7v + 10$
- f. $4 - 25t^2$
- g. $x^4 - 16$

Ⓢ **Question #16: Factor**

Reference Q.15075

Factor.

- a. $7x^2 - 19x - 6$
- b. $3 + x - 2x^2$
- c. $a^2 - 64b^2$
- d. $108 - 3z^2$
- e. $x^4 + 5x^2 + 4$
- f. $8v^2 - 32v - 96$
- g. $625p^4 - 1$
- h. $2y^4 - y^2 - 3$
- i. $36 - 3x - 3x^2$

Ⓢ **Question #17: Classroom Floor**

Reference Q.14759

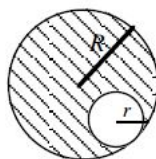
The floor of a classroom is rectangular with an area of $81m^2 - 4n^2$ square meters.

- a. Write expressions in m and n for the length and width of the floor.
- b. If the perimeter of the floor is 72 meters, form an equation in m and n and solve for m .
- c. Determine the length and width of the floor if the length is 25% greater the width.

Ⓢ **Question #18: Factoring Polynomials**

Reference Q.14762

The diagram shows a circle of radius R with a circle of radius r removed.



- a. Write an expression for the shaded area.
- b. Write the expression in a) in factored form.
- c. Determine the shaded area (as a multiple of π) if $R=8.5$ and $r=1.5$. Do not use a calculator.

Ⓢ **Question #19: Difference of Squares**

Reference Q.14966

Susan was showing Rose how the difference of squares method can be used to multiply certain numbers without using a calculator. She showed Rose the following:

$$38 \times 42 \\ (40-2)(40+2) = (40^2 - 2^2) = (1600 - 4) = 1596$$

- a. Use the above process to evaluate:
 - ii. 27×33
 - iii. 61×59
- b. Explain why this process cannot be used to determine the product 66×72 .
- c. Make up your own multiplication question which can be answered using this process.

Ⓢ **Question #20: Factoring Polynomials**

Reference Q.14763

The expression $\frac{1}{2}mv^2 - \frac{1}{2}mu^2$ occurs in physics.

- Write the expression in factored form.
- Determine the value of the expression when $m=10, v=75$, and $u=25$. Do not use a calculator.

Ⓢ **Question #21: Factoring**

Reference Q.15020

Which of the following are perfect square trinomials?

- $a^2 + 12a + 36$
- $x^2 - 25x + 50$
- $4x^2 - 4x + 1$
- $16y^2 + 32y + 16$
- $a^2 + 9a + 9$
- $25x^2 - 90x + 81$
- $1 - 16x + 64x^2$
- $y^2 + 20y - 100$

Ⓢ **Question #22: Factoring**

Reference Q.15022

Fill in the blanks so that each of the following is a perfect square trinomial.

- $x^2 + \underline{\hspace{1cm}} + 49$
- $x^2 - \underline{\hspace{1cm}} + 144$
- $9x^2 + \underline{\hspace{1cm}} + 36$
- $4m^2 + 24m + \underline{\hspace{1cm}}$
- $\frac{1}{4}a^2 + \underline{\hspace{1cm}} + 1$
- $225x^2 - \underline{\hspace{1cm}} + 16$
- $100x^2 + \underline{\hspace{1cm}} + y^2$
- $\underline{\hspace{1cm}} - 30y + 9y^2$

Ⓢ **Question #23: Factoring**

Reference Q.15024

Factor.

- $16x^2 - 8x + 1$
- $36 + 60x + 25x^2$
- $4a^2 - 12ab + 9b^2$
- $4x^2 - 44x + 121$
- $5x^2 + 10x + 5$
- $\frac{4}{9}x^2 + \frac{2}{9}x + \frac{1}{36}$

Ⓢ **Question #24: Factoring**

Reference Q.15026

Factor completely.

- $x^4 + 9x^2 + 20$
- $x^4 - 9x^2 + 20$
- $a^4 - 17a^2 + 16$
- $t^6 - 4t^3 - 21$
- $3x^4 + 9x^2 - 30$
- $2x^5 - 16x^3 + 32x$

Ⓢ **Question #25: Determine A Factor**

Reference Q.15052

One factor of $12x^2 + 10x - 8$ is

- $3x + 4$
- $3x - 4$
- $2x + 1$
- $6x - 1$

Ⓢ **Question #26: Factoring**

Reference Q.15063

From the expressions below, the one which does not represent a perfect square trinomial is

- $x^2 - 14x + 49$
- $144 + 24x + x^2$
- $4x^2 - 12x + 36$
- $9x^4 + 30x^2 + 25$

Ⓢ **Question #27: Factoring**

Reference Q.15064

When factored completely, the polynomial $k^4 + 16 - 17k^2$ is equal to

- $(k^2 - 1)(k^2 - 16)$
- $(k^2 + 1)(k^2 + 16)$
- $k^2(k + 1)(k + 16)$
- $(k + 1)(k - 1)(k + 4)(k - 4)$

Ⓢ **Question #28: Factor**

Reference Q.15079

Factor.

- $x^2 - 8xy - 33y^2$
- $6a^2 + 19ab + 10b^2$
- $15t^6 + t^3p^2 - 2p^4$

Ⓢ **Question #29: Determine The Value Of k**

Reference Q.15082

If $9a^2 + ka + 16$ is a perfect square trinomial, then the value of k must be ____.

Ⓢ **Question #30: Factoring**

Reference Q.15070

The polynomial expression $\frac{1}{16}x^2 + \frac{1}{3}x + \frac{4}{9}$ can be written in the form $(Ax + B)^2$. The value of the product AB , to the nearest one hundredth, is ____.

⑧ **Question #31: Factoring**

Reference Q.15071

Triangle PQR is right angled at P. The area of the triangle is $\frac{3}{2}x^2 + 10x + 16$ cm^2 , where x is a positive integer. Given that the length of PQ is 12 cm more than the length of PR, the length of QR, to the nearest tenth of a cm , is _____.

⑧ **Question #32**

Reference Q.45509

Factor: $\text{f}(x)^2 - (g(x))^2$

⑧ **Question #33**

Reference Q.45512

Factor: $4(x + 2)^2 - 9(2x - 1)^2$