

Name: ANSWER KEYPlace your answers in the spaces provided. You must show correct work to receive credit.

- (6 pts) 1. Given $h(t) = \frac{\sqrt{4t+13}}{t^2-2}$, find and simplify $h(-2)$. Leave your answer as a fraction in lowest terms. Do not use a calculator.

$$\begin{aligned} h(-2) &= \frac{\sqrt{4(-2)+13}}{(-2)^2-2} = \frac{\sqrt{-8+13}}{4-2} \\ &= \frac{\sqrt{5}}{2} \end{aligned}$$

$\frac{\sqrt{5}}{2}$

- (8 pts) 2. Simplify. Do not leave negative exponents in your answer.

$$\begin{aligned} &a^{\frac{1}{2}} b^{-\frac{3}{4}}^{12} \\ &= a^{\frac{1}{2} \cdot 12} b^{-\frac{3}{4} \cdot 12} = a^6 b^{-\frac{36}{4}} = a^6 b^{-9} \end{aligned}$$

$\frac{a^6}{b^9}$

- (8 pts) 3. Subtract and simplify.

$$\begin{aligned} &\frac{a}{a+3} - \frac{4}{a-5} \\ &= \frac{a(a-5)}{(a+3)(a-5)} - \frac{4(a+3)}{(a+3)(a-5)} \\ &= \frac{a(a-5) - 4(a+3)}{(a+3)(a-5)} \\ &= \frac{a^2 - 5a - 4a - 12}{(a+3)(a-5)} = \frac{a^2 - 9a - 12}{(a+3)(a-5)} \end{aligned}$$

$\frac{a^2 - 9a - 12}{(a+3)(a-5)}$ or $\frac{a^2 - 9a - 12}{a^2 - 2a - 15}$

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(14 pts) 4. Multiply and simplify. Express your answer as a polynomial.

(6 pts) (a) $(x + 4)(x - 5)$

$$= x^2 + 4x - 5x - 20$$

$$= x^2 - x - 20$$

$$x^2 - x - 20$$

(8 pts) (b) $(3x - 2y)^2$

$$= (3x - 2y)(3x - 2y)$$

$$= 9x^2 - 6xy - 6xy + 4y^2$$

$$9x^2 - 12xy + 4y^2$$

(16 pts) 5. Perform the indicated operation and simplify.

(8 pts) (a) $\frac{8x^7}{9y^9} \div \frac{12x^3}{y^5}$

$$= \frac{8x^7}{9y^9} \cdot \frac{y^5}{12x^3}$$

$$= \frac{2x^4}{9y^4} \cdot \frac{1}{3}$$

$$\frac{2x^4}{27y^4}$$

(8 pts) (b) $\frac{x^2 + 3x + 2}{x^2 - 1} \cdot \frac{x - 3}{x^2 - x - 6}$

$$= \frac{(x + 2)(x + 1)}{(x + 1)(x - 1)} \cdot \frac{x - 3}{(x - 3)(x + 2)}$$

$$= \frac{1}{x - 1} \cdot \frac{1}{1}$$

$$\frac{1}{x - 1}$$

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(14 pts) 6. Factor each of the following completely.

(8 pts) (a) $3x^3 - 14x^2 - 5x$

$$= x(3x^2 - 14x - 5)$$

$$= x(3x + 1)(x - 5)$$

$x(3x + 1)(x - 5)$

(6 pts) (b) $2a^2 - 32b^2$

$$= 2(a^2 - 16b^2)$$

$$= 2(a + 4b)(a - 4b)$$

$2(a + 4b)(a - 4b)$

(12 pts) 7. Solve for x . Check your answer(s).

$$\frac{2x}{x+3} + \frac{4}{x} = \frac{18}{x^2 + 3x}$$

$$x(x+3) \frac{2x}{x+3} + \frac{4}{x} = \frac{18}{x(x+3)} x(x+3)$$

$$2x(x) + 4(x+3) = 18$$

$$2x^2 + 4x + 12 = 18$$

$$2x^2 + 4x - 6 = 0$$

$$x^2 + 2x - 3 = 0$$

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

$$x+3 = 0 \quad x-1 = 0$$

$$x = -3, \quad x = 1$$

 $x =$

1

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- (12 pts) 8. Two consecutive odd integers are such that three times the first plus the square of the second is 64. Find the two consecutive odd integers. (Name a variable, set up an equation, and solve.)

let x = first odd integer
 then $x + 2$ = next odd integer

$$3x + (x + 2)^2 = 64$$

$$3x + x^2 + 4x + 4 = 64$$

$$x^2 + 7x - 60 = 0$$

$$(x + 12)(x - 5) = 0$$

$$x + 12 = 0, \quad x - 5 = 0$$

$$x = -12, \quad x = 5$$

first odd integer =

5

second odd integer =

7

- (10 pts) 9. Rebecca rides her bike 6 miles per hour faster than Melissa. In the same amount of time it takes Melissa to ride 9 miles, Rebecca rides 14 miles. Find the rate at which Melissa rides her bike. (Name a variable, set up an equation, and solve.)

Let r = rate at which Melissa rides
 Then $r + 6$ = rate at which Rebecca rides

	r	t	d
Melissa	r	$\frac{9}{r}$	9
Rebecca	$r + 6$	$\frac{14}{r + 6}$	14

$$\frac{9}{r} = \frac{14}{r + 6}$$

$$9(r + 6) = 14r$$

$$9r + 54 = 14r$$

$$54 = 5r$$

$$r = 10.8$$

10.8 mph

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