

Name: KEY

Score: _____ / 100

Student ID: _____

DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO

	1	2	3	4	5	6	7	8	9	10	11	12	Total
✓													
Score													

INSTRUCTIONS FOR STUDENTS

- Questions are on both sides of the paper. This is an 11 question exam (One extra credit problem can be attempted for a total of 12 questions).
- Students have 2 hours and 15 minutes to complete the exam.
- **PLEASE SHOW ALL WORK.** Any unjustified claims will receive no credit. Clearly box your final answer.
- You **MUST** complete 11 problems for credit. In the above table in the row with the ✓, please mark with a ✓ which problems you want to be graded. If you wish to do a 12th problem for extra credit, please write *EC* in the ✓ row for the problem you wish to be counted for extra credit.
- No notes, textbooks, phones, calculators, etc. are allowed for the exam.
- Each of the 11 questions you choose to do will be graded out of 3 points. The score will then be totaled and multiplied by 3 to get a raw score out of 99 points. One point will be given for clearly writing your name on the exam sheet. This will get you to 100 points. If you choose to do a 12th problem for extra credit, the most that will be awarded for that question will be 3 points. So, the highest possible score on this examination is 103 points out of 100.
- The back of the test can be used for scratch work.

GOOD LUCK!

FORMULAS:

Name	Formula
Square of Sum	$(A + B)^2 = A^2 + 2AB + B^2$
Square of Difference	$(A - B)^2 = A^2 - 2AB + B^2$
Sum of Square	$(A + B)(A - B) = A^2 - B^2$
Difference of Cubes	$F^3 - L^3 = (F - L)(F^2 + FL + L^2)$
Sum of Cubes	$F^3 + L^3 = (F + L)(F^2 - FL + L^2)$

1) Simplify the following expression completely

$$\frac{x^2 + 3x - 18}{x^2 + x - 30}$$

$$= \frac{(x+6)(x-3)}{(x+6)(x-5)}$$

$$= \boxed{\frac{x-3}{x-5}}$$

2) Perform the indicated operation and simplify completely:

$$\frac{2x^2 - 32x}{x^2 - x - 20} \div \frac{8x - 2x^2}{2x^2 - 9x - 5}$$

$$= \frac{2x(x^2 - 16)}{(x-5)(x+4)} \cdot \frac{-2x(x-4)}{(2x+1)(x-5)}$$

$$= \frac{\cancel{2x}(x+4)\cancel{(x-4)}}{(x-5)\cancel{(x+4)}} \cdot \frac{(2x+1)(x-5)}{\cancel{-2x}(x-4)}$$

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

Mult to -10

Add to -9

$\Rightarrow -10, 1$

$$2x^2 - 10x + x - 5$$

$$2x(x-5) + (x-5)$$

$$(2x+1)(x-5)$$

3) Perform the operations and simplify completely:

$$\frac{t}{x-t} - \frac{x}{x+t}$$

$$\text{LCD} = (x-t)(x+t)$$

$$\Rightarrow \frac{t(x+t)}{(x-t)(x+t)} - \frac{x(x-t)}{(x-t)(x+t)}$$

$$\Rightarrow = \frac{xt + t^2 - x^2 + xt}{(x-t)(x+t)}$$

$$= \boxed{\frac{t^2 + 2xt - x^2}{(x+t)(x-t)}}$$

4) Perform the operations and simplify completely:

$$\frac{10}{x-1} + y$$

$$\text{LCD} = (x-1)$$

$$= \frac{10}{x-1} + \frac{y(x-1)}{(x-1)}$$

$$= \boxed{\frac{10 + xy - y}{x-1}}$$

$$= \boxed{\frac{10 + (x-1)y}{(x-1)}}$$

5) Perform the operations and simplify:

$$\frac{x-1}{x^2+3x+2} + \frac{x+5}{x^2+4x+3}$$

$$= \frac{x-1}{(x+2)(x+1)} + \frac{x+5}{(x+3)(x+1)}$$

$$= \frac{(x-1)(x+3) + (x+5)(x+2)}{(x+1)(x+2)(x+3)}$$

$$= \frac{x^2+2x-3 + x^2+7x+10}{(x+1)(x+2)(x+3)} = \frac{2x^2+9x+7}{(x+1)(x+2)(x+3)}$$

$$= \frac{(2x+7)(x+1)}{(x+1)(x+2)(x+3)}$$

$$= \boxed{\frac{2x+7}{(x+2)(x+3)}}$$

LCD = (x+1)(x+2)(x+3)

6) Simplify the complex fraction completely:

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

$$= \frac{-4x}{(x+1)(x-1)} \cdot \frac{(x+1)(x-1)}{2x^2+2}$$

$$= \frac{-4x}{2x^2+2} = \boxed{\frac{-2x}{x^2+1}}$$

7) Simplify the complex fraction completely:

$$\frac{1}{x + \frac{1}{x+1}} = \frac{\frac{1}{1}}{\frac{x(x+1)+1}{x+1}} = \frac{1}{1} \cdot \frac{x+1}{x^2+x+1} = \boxed{\frac{x+1}{x^2+x+1}}$$

8) Solve the following equation for x :

$$\frac{3}{x-2} + \frac{1}{x} = \frac{6x+4}{x^2-2x}$$

$$\text{LCD} = x(x-2)$$

$$\Rightarrow \frac{3}{x-2} + \frac{1}{x} = \frac{6x+4}{x(x-2)}$$

$$\Rightarrow \frac{3x(x-2)}{x-2} + \frac{x(x-2)}{x} = \frac{(6x+4)\cancel{x(x-2)}}{\cancel{x(x-2)}}$$

$$\Rightarrow 3x + x - 2 = 6x + 4$$

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

$$-6 = 2x$$

$$\boxed{x = -3}$$

9) Solve the following equation for x :

$$\frac{x}{x-2} = \frac{2}{x-2} + 2$$

$$\Rightarrow \frac{x}{x-2} = \frac{2}{x-2} + \frac{2(x-2)}{(x-2)}$$

$$\Rightarrow \frac{x}{x-2} = \frac{2 + 2x - 4}{x-2}$$

$$\Rightarrow 0 = \frac{x-2}{x-2} = 1$$

No solution

10) Bill can ride his bicycle $5 \frac{\text{mi}}{\text{hr}}$ faster than Jim. Bill can ride 40 mi in the same time it takes Jim to ride 30 mi . Find the speeds that Bill and Jim can ride their bicycles.

	d	r	t
Bill	40	$x+5$	$\frac{40}{x+5}$
Jim	30	x	$\frac{30}{x}$

$$d = rt \Rightarrow \frac{d}{r} = t$$

$$\Rightarrow \frac{40}{x+5} = \frac{30}{x}$$

$$\Rightarrow 40x = 30(x+5)$$

$$40x = 30x + 150$$

$$10x = 150$$

$$x = 15$$

Jim $15 \frac{\text{mi}}{\text{hr}}$
 Bill $20 \frac{\text{mi}}{\text{hr}}$

11) In a basketball game, the home team was down by 9 points at the end of the game. They only scored 6 points for every 7 points the visiting team scored. What was the final score of the game?

$$\frac{x-9}{x} = \frac{6}{7}$$

$x =$ final score
for
away team

$$7(x-9) = 6x$$

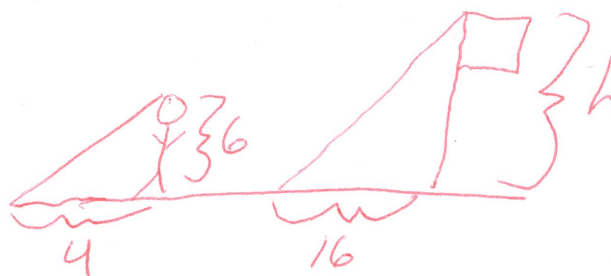
$$7x - 63 = 6x$$

$$x - 63 = 0$$

$$x = 63 \Rightarrow x - 9 = 54$$

$$\boxed{63 \text{ to } 54}$$

12) On flat ground, a six foot tall man casts a shadow that is 4 feet long. If the shadow of a flag pole is 16 feet long, how tall is the flag pole? *Hint: Draw the picture.*



$$\frac{4}{6} = \frac{16}{h}$$

$$4h = 16(6)$$

$$4h = 96$$

$$\boxed{h = 24 \text{ ft}}$$

THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK

END OF TEST