

Calculus I Readiness Quiz

Name: **KEY**

I pledge by the Honor Code that this work is my own, I did not use a computer program, calculator, a tutor or any other mechanical or human help that prevents me from using my own mind.

Pledge:

SHOW ALL WORK. Any answers without work will not receive full credit.

1. Express as a single fraction in reduced form: $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$ common denominator: 60

$$\frac{30}{60} + \frac{20}{60} + \frac{15}{60} + \frac{12}{60} = \boxed{\frac{77}{60}}$$

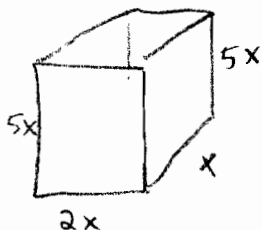
2. Simplify and get rid of all negative exponents: $\left(\frac{x^{4/3}}{8y^{-6}}\right)^{2/3}$

$$\frac{x^{(4/3)(2/3)}}{8^{2/3} y^{-6(2/3)}} = \frac{x^{8/9}}{2 y^{-4}} = \boxed{\frac{x^{8/9} y^4}{4}}$$

3. $64^{-1/3} \cdot 4^5 = 2^{\square}$

$$(2^6)^{-1/3} \cdot (2^2)^5 = 2^{-2} \cdot 2^{10} = \boxed{2^8}$$

4. What is the surface area of a box with open top, with length x , width $2x$ and height $5x$?



$$\begin{aligned} & \text{front + back} && \text{sides} && \text{bottom (not top)} \\ & 2(5x)(2x) + 2(x)(5x) + x(2x) \\ & = 20x^2 + 10x^2 + 2x^2 = \boxed{32x^2} \end{aligned}$$

5. Simplify completely: $\frac{x-2}{x^2+4x} - \frac{3x}{x^2-16}$

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

$$= \frac{x^2 - 6x + 8 - 3x^2}{x(x+4)(x-4)} = \frac{-2(x^2 + 3x - 4)}{x(x+4)(x-4)} = \frac{-2(x+4)(x-1)}{x(x+4)(x-4)}$$

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

6. Simplify completely: $\frac{x^2y^4 + 2yx + x^3y}{x^4y^3}$

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

7. Simplify completely: $\frac{\frac{1}{(h+2)^2} + \frac{1}{4}}{h} = \frac{\frac{1}{(h+2)^2} \cdot \frac{4}{4} + \frac{1}{4} \frac{(h+2)^2}{(h+2)^2}}{h}$

$$= \frac{\frac{4 + (h+2)^2}{4(h+2)^2}}{h} = \frac{4 + h^2 + 4h + 4}{4h(h+2)^2} = \boxed{\frac{h^2 + 4h + 8}{4h(h+2)^2}}$$

8. Rationalize the denominator: $\frac{1}{1 + \sqrt{x-3}} \left(\frac{1 - \sqrt{x-3}}{1 - \sqrt{x-3}} \right)$

$$= \frac{1 - \sqrt{x-3}}{1 - x + 3} = \boxed{\frac{1 - \sqrt{x-3}}{4 - x}}$$

9. If $f(x) = \frac{x+1}{3x+2}$, then what is $f(2m+1)$? Simplify completely.

$$f(2m+1) = \frac{(2m+1)+1}{3(2m+1)+2} = \boxed{\frac{2m+2}{6m+5}}$$

10. Find all possible intersections of the following line and parabola: $y + 2x = 1$ and $y = 2x^2 - 9x - 3$

$$y = 1 - 2x = 2x^2 - 9x - 3 \rightarrow x = -1/2: y = 1 - 2(-1/2)$$

$$0 = 2x^2 - 7x - 4$$

$$y = 1 + 1 = 2$$

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

$$\boxed{(-1/2, 2)}$$

$$\boxed{x = -1/2, 4}$$

$$x = 4: y = 1 - 2(4)$$

$$y = -7$$

$$\boxed{(4, -7)}$$

11. Which is a factor of $8a^2b^2c - 2b^4c$?

a. $8a^2b^2c$

b. $4a^2 - c$

c. $2a + b$

d. $2b - b^2$

e. $4b^2c$

f. $2b^4c$

e. none of these

f. two of these (circle both)

$$2b^2c(4a^2 - b^2)$$

$$2b^2c(2a+b)(2a-b)$$

12. What is the equation of the line with slope $m = 5$ that passes through $(1,2)$?

$$5 = \frac{y-2}{x-1}$$

$$y = 5x - 3$$

$$5x - 5 = y - 2$$

13. What is the slope of the line perpendicular to $2y + x = 8$?

$$2y = 8 - x$$

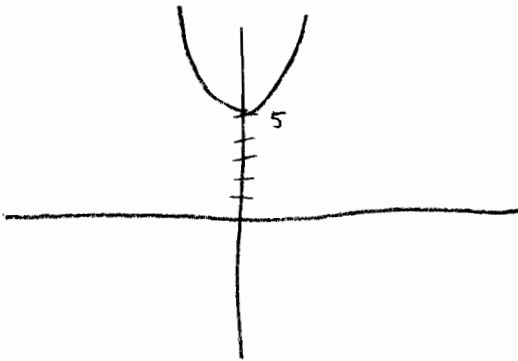
$$y = 4 - \frac{1}{2}x$$

$$y = -\frac{1}{2}x + 4 = mx + b$$

$m = -1/2$ so slope of line \perp to this is

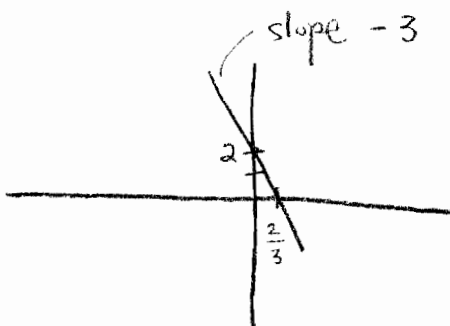
$$m = 2$$

14. Graph $y = x^2 + 5$.



$f(x) = x^2$ shifted up by 5.

15. Graph $3x + y = 2$.



$$y = -3x + 2$$