

## L2 Algebra Practice #3

1. Simplify as one log:  $\log_b(x) + 2 \log_b(y)$

2. Simplify:  $\frac{x^3 + 6x^2 + 9x}{x^2 + 3x}$

3. Make  $x$  the subject of:  $y = \frac{4}{3x} - 1$

4. Mary invests \$10 000 in government bonds. They pay 8% interest at the end of each year, which is then reinvested. The money she has after  $y$  years is therefore:

$$M = 10\,000 (1.08)^y$$

Where  $M$  = is the amount she has, in dollars.

And  $y$  = the number of full years it is invested.

After how many years will her sum with interest be \$25 000 or more?

5. Solve:  $\log_4(256) = x$

6. Solve:  $-2(x + 1) > 5$

7. Solve:  $4x - 5 = \frac{3}{2x}$

8. Find two numbers that have a sum of 32 and a sum of their squares of 514.

## Answers: L2 Algebra Practice #3

1.  $\log_b(x) + 2 \log_b(y) = \log_b(x) + \log_b(y^2) = \mathbf{\log_b(x y^2)}$

2.  $\frac{x(x^2 + 6x + 9)}{x^2 + 3x} = \frac{x(x+3)(x+3)}{x(x+3)} = \frac{x(x+3)\cancel{(x+3)}}{\cancel{x}(x+3)} = x + 3$

3.  $y = \frac{4}{3x} - 1$        $y + 1 = \frac{4}{3x}$        $(3x)(y + 1) = 4$   
 $x = \frac{4}{3(y+1)}$        $x = \frac{4}{3y+3}$

4.  $M = 10\,000(1.08)^y$       Putting in our values:  $25\,000 = 10\,000(1.08)^y$

$\log(25\,000) = \log(10\,000(1.08)^y)$

$\log(25000) = \log(10000) + y \log(1.08)$

Rearranging:  $y = \frac{\log(25000) - \log(10000)}{\log(1.08)} = 11.9059.$

Need to round up, since interest at end of the year

**12 years**

5.  $\log_4(256) = x$       If  $y = b^x$  then  $\log_b y = x$  so here  $256 = 4^x$        **$x = 4$**

6.  $-2(x + 1) > 5$        $-2x - 2 > 5$        $-2 - 5 > 2x$        **$x < -3.5$**

7.  $4x - 5 = \frac{3}{2x}$        $2x(4x - 5) = 3$        $8x^2 - 10x = 3$   
 $8x^2 - 10x - 3 = 0$       calculator       **$x = -0.25$  or  $1.5$**

8.  $a + b = 32$  and  $a^2 + b^2 = 514$       rearranging the first:  $a = 32 - b$   
 substituting to remove  $a$ :  $(32 - b)^2 + b^2 = 514$       expanding:  $1024 - 64b + b^2 + b^2 = 514$   
 $2b^2 - 64b + 510 = 0$        $b = 15$  or  $17$   
 solving using  $a + b = 32$  gives  $a = 17$  or  $15$       **The numbers are 15 and 17**

**(Q4 and Q8 are Merit)**