

# CALCULATOR APPLICATIONS TIPS (FEBRUARY 2019))

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1. A canoe travels 15 miles downstream in 4 hours. In the same time it can travel 9 miles upstream. Calculate the rate of the current in miles per hour.  
1 = \_\_\_\_\_ mph

Let  $R$  = rate of the canoe in still water ;  $C$  = rate of the current

	Distance	Rate	Time
Downstream	15	$R + C$	4
Upstream	9	$R - C$	4

Time x Rate = Distance

$$4(R + C) = 15$$

$$4(R - C) = 9$$

$$4R + 4C = 15$$

$$4R - 4C = 9$$

Since you are looking for the rate of the current,  $C$ , eliminate  $R$  by subtracting the bottom equation from the top equation.

$$(4R + 4C = 15) - (4R - 4C = 9)$$

$$8C = 6 ; C = 6/8 = .750 ; \text{ Answer : } .750 \text{ mph}$$

2. An ellipse is inscribed in a rectangle with length 521 and width 231. Find the area between the ellipse and the rectangle.  $2 = \underline{\hspace{10em}}$

Area of rectangle - Area of an ellipse

$$(\text{length})(\text{width}) = \text{'}$$

$$(\text{semi-major axis})(\text{semi-minor axis})(\pi)$$

$$(521)(231) = (521/2)(231/2)(\pi) = 2.58 \times 10^4$$

3. A bicycle tire has an outside diameter of 22 inches. Calculate the number of revolutions this tire makes on a 10 mile bike ride.

$$3 = \underline{\hspace{10em}} \text{ rev}$$

Note : 1 mile = 5280 feet ; 1 foot = 12 inches

$$10 \text{ miles} = 10(5280)(120)$$

$$\text{Circumference} = 2\pi(\text{radius}) = \pi(\text{diameter})$$

$$= \pi(22)$$

$$\text{Number of revolutions} = \frac{10(5280)(120)}{22\pi} = 9.17 \times 10^3$$

4. Calculate the area of a regular octagon with a side of 219 inches and an apothem of 264.35663.

4 = \_\_\_\_\_ in

$$\text{Area} = (1/2)(\text{apothem})(\text{perimeter})$$

$$\text{Area} = (1/2)(264.35663)(8 \times 219) = 2.32 \times 10^5$$

5. Taylor deposits \$4,000 into an account that earns 4 1/2% compounded annually. Calculate the number of years it would take to have at least \$10,000 in the account.

5 = \_\_\_\_\_ (INT)

$$A(t) = P\left(1 + \frac{r}{n}\right)^{nt}, \text{ where } A(t) \text{ is amount at time, } t ;$$

P = principal ; r = rate as a decimal, n = number of intervals ; t = time

$$10000 = 4000\left(1 + \frac{.045}{1}\right)^{t(1)}$$

$$10000 = 4000(1.045)^t$$

When solving for an exponent, find the common logarithm of both sides.

$$\frac{10000}{4000} = 1.045^t$$

$$\text{Log}(1.045^t) = \text{Log}\left(\frac{10000}{4000}\right)$$

$$\text{Note : } \text{Log}(P)^n = n\text{Log}P$$

$$t\text{Log}(1.045) = \text{Log}\left(\frac{10000}{4000}\right)$$

$$t = \frac{\text{Log}\left(\frac{10000}{4000}\right)}{\text{Log}(1.045)} = 20.8 ; \text{ Integer answer is 21.}$$