Monday Jan 19th, 2015

Name: SOLUTION

ID #:

Math 102-001 Fall 2015 Quiz #1

1. An object is heated at a constant rate. At time t=0, it's temperature is T=16.2°C. Every hour the temperature rises by 0.4°C. *[8 marks]*

a) Write an equation to express the temperature T in terms of the time passed t.

$$T = 16.2 + 0.4t$$

b) Use your equation to find the temperature after 6 ½ hours have passed. (use a full sentence for the final answer)

LET $t = 6.5$

THEN $T = 16.2 + (0.4)(6.5) = 18.8$

AFTER 6½ HOURS THE TEMPERATURE IS 18.8°C

c) After how many hours will the temperature of the object reach 30°C? (use a full sentence for the final answer)

LET $T = 30$

SOLVE $30 = 16.2 + 0.4t$

$13.8 = 0.4t$

$t = 34.5$

THE TEMPERATURE WILL REACH 30°C AFTER 34.5 HOURS.

d) A second object is cooled at the same time. Its temperature (T_2) is modeled by the equation $T_2 = 26.4 - 0.8t$

After how many hours will the two objects have the same temperature? (use a full sentence for the final answer)

SOLVE $16.2 + 0.4t = 26.4 - 0.8t$

$1.2t = 10.2$

$t = 8.5$

BOTH OBJECTS WILL HAVE THE SAME TEMPERATURE AFTER 8.5 HOURS.

2. *[12 marks]*

a) Write as a single fraction: $\left(\frac{3}{2}-\frac{1}{3}\right)\div\frac{4}{3}$

$$=\left(\frac{9}{6}-\frac{2}{6}\right)\times\frac{3}{4} \quad = \frac{7}{6}\times\frac{3}{4} \quad = \frac{7}{8}$$

b) Evaluate: $\left(\frac{4}{9}\right)^{-\frac{3}{2}}$

$$=\left(\frac{9}{4}\right)^{3/2} = \left(\sqrt{\frac{9}{4}}\right)^{3} = \left(\frac{3}{2}\right)^{3} = \frac{27}{8}$$

c) Factor completely: $2x^6-32x^2$

$$= 2x^2\left(x^4-16\right)$$
$$= 2x^2\left(x^2-4\right)\left(x^2+4\right)$$
$$= 2x^2\left(x-2\right)\left(x+2\right)\left(x^2+4\right)$$

d) Simplify: $\dfrac{(3x^2y^{-1})(2xy^2)^3}{6x^4y^{-5}}$

$$=\frac{\left(3x^2y^{-1}\right)\left(8x^3y^6\right)}{6x^4y^{-5}} \quad = \frac{24x^5y^5}{6x^4y^{-5}} \quad = 4xy^{10}$$

e) Solve for x: $3x^2+x=2$

$$3x^2+x-2=0$$
$$(3x-2)(x+1)=0$$
$$x=\frac{2}{3} \quad \text{AND} \quad x=-1$$

[OR USE QUADRATIC FORMULA]

f) Solve for x: $\dfrac{3}{2x+1}=\dfrac{2}{x-1}$

$$3(x-1) = 2(2x+1)$$
$$3x-3 = 4x+2$$
$$-x = 5$$
$$x = -5$$