Grade 9 Mathematics Worksheet

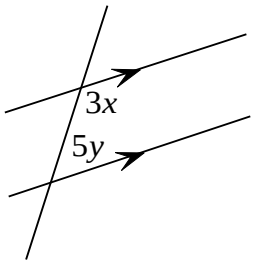
Parallel lines, angles and exponents

Questions:

1. In each of the following statements, state whether it is true or false and give a reason for your choice.

   a) The point $\left(\frac{1}{5};\frac{23}{5}\right)$ lies on both the graphs of $y=3x+4$ and $y+2x=5$

   b)



   The relationship in the diagram above can be expressed as $3x+5y-180°=0$ and also as $x=60°-\frac{5}{3}y$ or as $180°-\frac{5}{3}x=y$

   c) If $2^x=4$, then $4x+3=11$

   d) If $(x-2)^2=4$, then $2^x\times 3^2$ will be equal to 48 or it can be equal to zero

   e) The point $(2;9)$ satisfies the inequation $y\geq 3x+1$

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Solution:

1. a) $y=3x+4\big|_{x=\frac{1}{5}}=3\left(\frac{1}{5}\right)+4=\frac{3+20}{5}=\frac{23}{5}$ *and* $y=-2x+5\big|_{x=\frac{1}{5}}=-2\left(\frac{1}{5}\right)+5=\frac{-2+25}{5}=\frac{23}{5}$

So the point does lie on both the graphs.

b) Because the lines are parallel, the angles are co-interior supplementary angles. Thus $3x+5y=180°$

So: $3x+5y-180°=0 \rightarrow 3x=180°+5y \rightarrow x=60°+\frac{5}{3}y \neq 60°-\frac{5}{3}y$. So the first statement is untrue.

Also: $3x+5y=180° \rightarrow 5y=-3x+180° \rightarrow y=36°-\frac{3}{5}x \neq 180°-\frac{5}{3}x$. So the second statement is untrue.

c) If $2^x=4$, *then* $2^x=2^2$. So this means that *x* = 2. Then $4x+3=4(2)+3=11$. This is thus true.

d) $(x-2)^2=4 \Rightarrow x-2=\pm 2 \Rightarrow x=2\pm 2 \Rightarrow x=4$ *or* $x=0$.

If *x* = 0: $2^x\times 3^2=2^0\times 9=1\times 9=9$.

If *x* = 4: $2^x\times 3^2=2^4\times 9=16\times 9=144$.

So the answers that were given are incorrect.

e) $y\geq 3x+1\big|_{x=2}=3(2)+1=7$. So if $x=2, y>7$. So the point (2 ; 9) does lie in this area.

To test whether a point lies on a graph we substitute the *x* value in and calculate the *y* value. Manipulating a formula is a skill that is necessary for a wide variety of subjects.