

Answers

for Grade 12 Group Assignments - Quarter #3

Notes:

- Answers for group assignment problems that are out of the workbook can be found in the file named "G12 – Workbook Answers...".
- This answer key doesn't include all answers.

Week 17 No answers needed

Week 18

The parabola "extra challenge".

Call a random point on the curve (x,y) , such that the distance from this point to the focal point $(7,11)$ is equal to the distance from (x,y) to a point (c,d) on the directrix line. This leads to the equation

$$(x-c)^2 + (y-d)^2 = (x-7)^2 + (y-11)^2$$

We arrive at a second equation because the directrix line has the equation $y = -\frac{2}{3}x + 7$, so the point (c,d) on this line gives us $d = -\frac{2}{3}c + 7$. The third equation comes from the slope of the line connecting (x,y) and (c,d) , which must be equal to $\frac{3}{2}$, leading to the equation $\frac{y-d}{x-c} = \frac{3}{2}$

The work is shown below.

Week 19-24 No answers needed

$$\begin{aligned}
 3d + 2c &= 21 \rightarrow d = -\frac{2}{3}c + 7 \\
 -\frac{y-d}{x-c} &= \frac{3}{2} \rightarrow 2y - 2d = 3x - 3c \\
 (x-c)^2 + (y-d)^2 &= (x-7)^2 + (y-11)^2 \\
 \rightarrow 2y - 2(-\frac{2}{3}c + 7) &= 3x - 3c \\
 2y + \frac{4}{3}c - 14 &= 3x - 3c \\
 2y - 3x - 14 &= -\frac{13}{3}c \\
 c &= -\frac{6}{13}y + \frac{9}{13}x + \frac{42}{13} \\
 (x + \frac{6}{13}y - \frac{9}{13}x + \frac{42}{13})^2 + (y + \frac{2}{3}(-\frac{6}{13}y + \frac{9}{13}x + \frac{42}{13}) - 7)^2 &= (x-7)^2 + (y-11)^2 \\
 (x + \frac{6}{13}y - \frac{9}{13}x - \frac{42}{13})^2 + (y + \frac{4}{13}y + \frac{6}{13}x + \frac{28}{13} - 7)^2 &= \\
 (\frac{4}{13}x + \frac{6}{13}y - \frac{42}{13})^2 + (\frac{9}{13}y + \frac{6}{13}x - \frac{63}{13})^2 &= 169(\dots) \\
 &\text{which simplifies to...} \\
 117x^2 + 52y^2 - 156xy - 1274x - 2080y + 22997 &= 0 \\
 \text{vertex is at } (5, 8) &
 \end{aligned}$$