Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 1.2

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1. (1 pt)
Find the equation in general form of the line having slope equal $\frac{1}{4}$ and passing through the point (3, 6).

x + _____ y = _____

Does the point (0, 7.25) lie on the line?

- no
- yes

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2. (1 pt)
For each pair of lines below, determine whether they are parallel, perpendicular, or neither.

$1x+y=-20$, $-2x-y=20$

- parallel
- perpendicular
- neither

$y=0.1x+9$, $0.5x-5y+0.25=0$

- parallel
- perpendicular
- neither

$5x+y=-5$, $10x-y=5$

- parallel
- perpendicular
- neither

$y=0.1x+9$, $-0.6x+6y+0.25=0$

- parallel
- perpendicular
- neither

$y=0.3x+9$, $0.3x-y+0.25=0$

- parallel
- perpendicular
- neither

$y=30x+7$, $-0.0333333333333333x-y-1=0$

- parallel
- perpendicular
- neither

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3. (1 pt)
Given the following three points, what is the fourth point needed to form a square?

(2, 5), (10, 10), (7, -6)

Fourth point: (_____, _____)

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4. (1 pt)
Use slopes to determine whether the points (0.35, 25), (17, -50), (-4, 0) form a triangle.

- no
- yes

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5. (1 pt)
Let the line L have the following properties.

A. It is perpendicular to the line $8x+6y=27$
B. The area of the triangle formed by L and the x and y axes equals 140.
C. The y-intercept of L is positive.

Find the equation of L in slope-intercept form.

y = _____

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6. (1 pt)
Find the equation in slope-intercept form of the perpendicular bisector of the line connecting the two points (-2.5, 4) and (20, 18).

y = _____

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7. (1 pt)
The ratio of the horizontal distance a road runs to the vertical rise or drop over that distance is call the **grade**. This is the same definition as slope, but it is usually expressed as a percentage.

A road is to be designed with a maximum grade of 5%. It must climb a vertical distance of 1500 feet. What is the minimum horizontal distance the road will need to run?

distance = _____ feet

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8. (1 pt)
All but one of the following equations describe the same line. Which is different?

- $y=-10.5x+16$
- $y+10.5x=57.5$
- $8y+128=-10.5(8x-56)$
- $-21x-2y=-115$

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9. (1 pt)
The two temperature scales Celsius and Fahrenheit are related by a linear equation. The freezing temperature of water is 0 degrees Celsius and 32 degrees Fahrenheit; its boiling temperatures are 100 and 212 degrees, respectively.

Find the relationship between the two scales. Express it as the equation of a line $F=mC+b$.

F = _____

At what temperature is Celsius equal to Fahrenheit?

_____ degrees

10. (1 pt)
Find the equation of the line parallel to $y+4=18(x-1)$ passing through the point (8, 10).

y = _____

11. (1 pt)
Find the equation of a line (in slope-intercept form) through the point (1.5, 2.5) that is perpendicular to the line containing the points (2, -0.5) and (8.5, 3.5).

$y=$ _____

12. (1 pt)
Consider a triangle with vertices $(-0.5,8)$, $(-6,3)$, and $(8.5,-1.5)$. Determine the point (x,y) where the perpendicular bisectors of the triangle meet.

(x,y) = (_____, _____)

13. (1 pt)
Consider a quadrilateral with vertices $(6,3)$, $(5,-6)$, $(-3.5,-3.5)$, and $(-1.5,3.5)$. Determine the point (x,y) where the diagonals of the quadrilateral intersect.

$(x,y)=$ (_____, _____)

14. (1 pt)
Given the following three points, determine the point in the second quadrant ($x \geq 0, y \leq 0$), needed to form a parallelogram.
$(-4,3.5)$, $(5.5,1)$, $(-7.5,-1.5)$

Fourth point: $(x,y)=$ (_____, _____)

15. (1 pt)
Consider the triangle *ABC* with vertices $A=(3.5,6.5)$, $B=(-5,-3.5)$, and $C=(6,4.5)$. Determine the equation of the altitude of the triangle *ABC* through the vertex *A*. (The altitude through a vertex of a triangle is the line perpendicular to the opposite side of the triangle.)

$y=$ _____