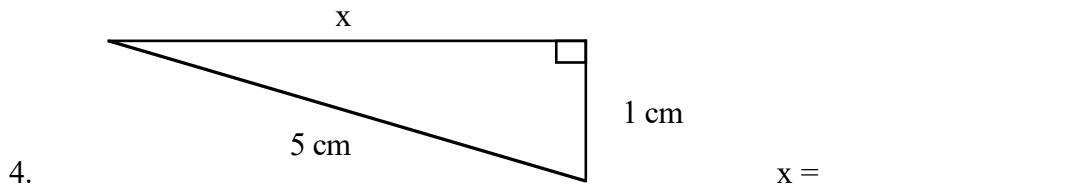
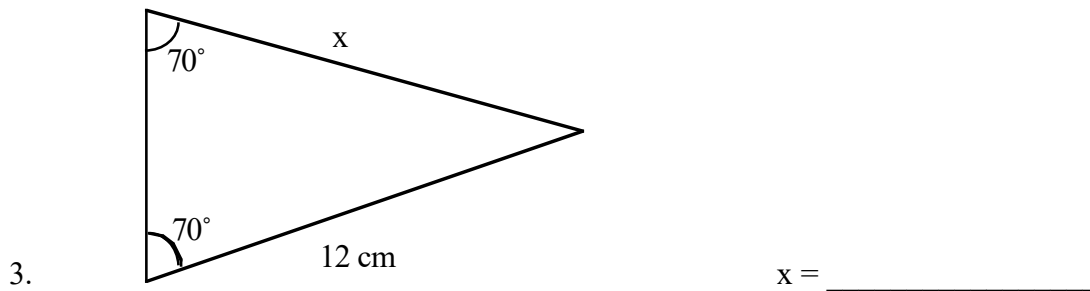
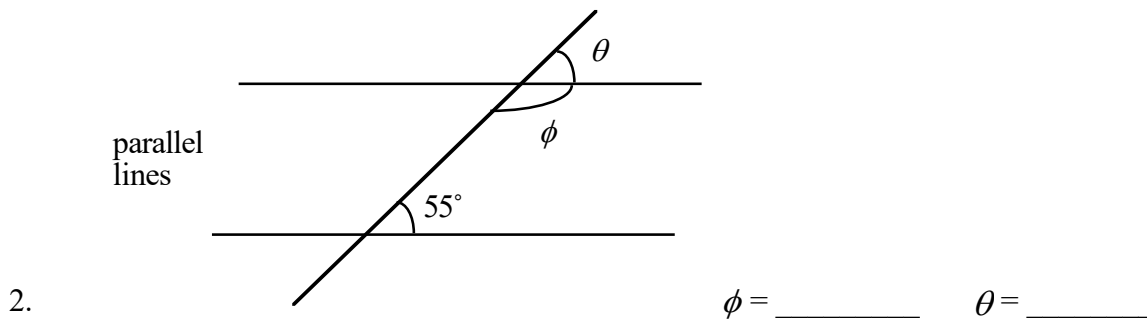
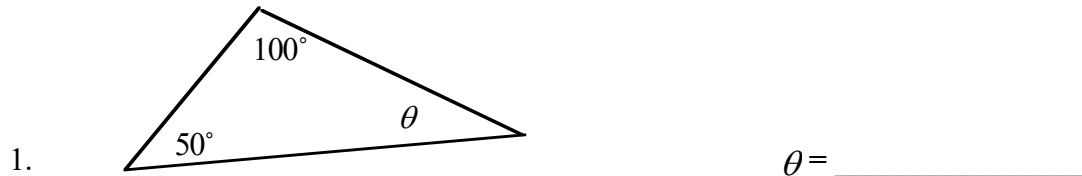


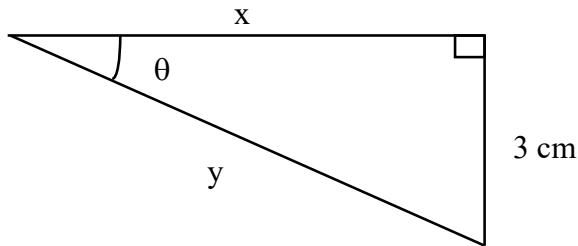
Math Self-Diagnostic

Note: This is not a test! It will have no effect on your grade. Its sole purpose is to help diagnose your weakness, if any, in the math, which is needed in this lab.

Part 1. Angles and Triangles



Part 2. Trigonometry



$$\sin \theta = 0.60$$

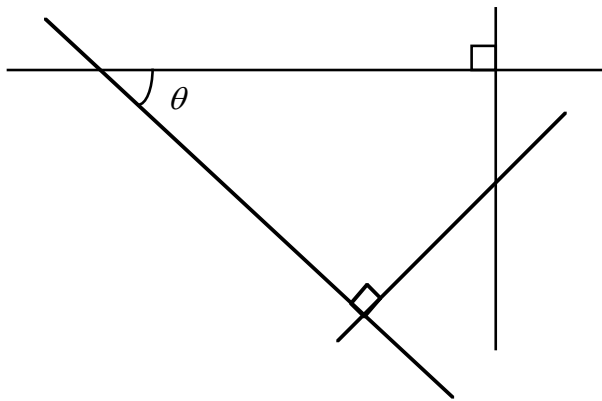
$$x = \underline{\hspace{2cm}}$$

$$y = \underline{\hspace{2cm}}$$

5.

6. If $\sin 35^\circ = \cos \theta$, then $\theta = \underline{\hspace{2cm}}$

7. If $\sin \theta = 0.80$, then $\cos \theta = \underline{\hspace{2cm}}$ and $\tan \theta = \underline{\hspace{2cm}}$



Mark all angles that are equal to the angle θ .

How many did you mark (including the one that was already marked)? $\underline{\hspace{2cm}}$

8.

9. For what values of θ , if any, is the following expression true?

$$\sin^2 \theta + \cos^2 \theta = 2.0 \quad \theta = \underline{\hspace{2cm}}$$

Part 3. Scientific Notation

In scientific work, it is convenient to express numbers as the product of a number between 1 and 10 multiplied by an appropriate power of 10. Thus 0.00050 becomes 5.0×10^{-4} , and 1,800,000 is written as 1.8×10^6 . This way of writing numbers is called scientific (or powers of ten) notation.

Carry out the operations indicated and express the results in scientific notation.

10. $2 * 0.000015 = \underline{\hspace{2cm}}$

11. $(0.00002)^3 = \underline{\hspace{2cm}}$

12. $(7.1 * 10^5) + (2.2 * 10^4) = \underline{\hspace{2cm}}$

13. $(4 * 10^8) * (9 * 10^9) = \underline{\hspace{2cm}}$

14. $(3 * 10^7) * (6 * 10^{-12}) = \underline{\hspace{2cm}}$

Part 4. Algebra

15. Given that $T = 2\pi\sqrt{l/g}$, write an expression, which contains only l on the left-hand side.

$$l = \underline{\hspace{10em}}$$

16. $3x - 5 = 13$ $x = \underline{\hspace{10em}}$

17. $a^2 + a^2 + 2a^2 = \underline{\hspace{10em}}$

18. The radius of a circle is R . Write an expression for the area of the circle.

$$\text{Area} = \underline{\hspace{10em}}$$

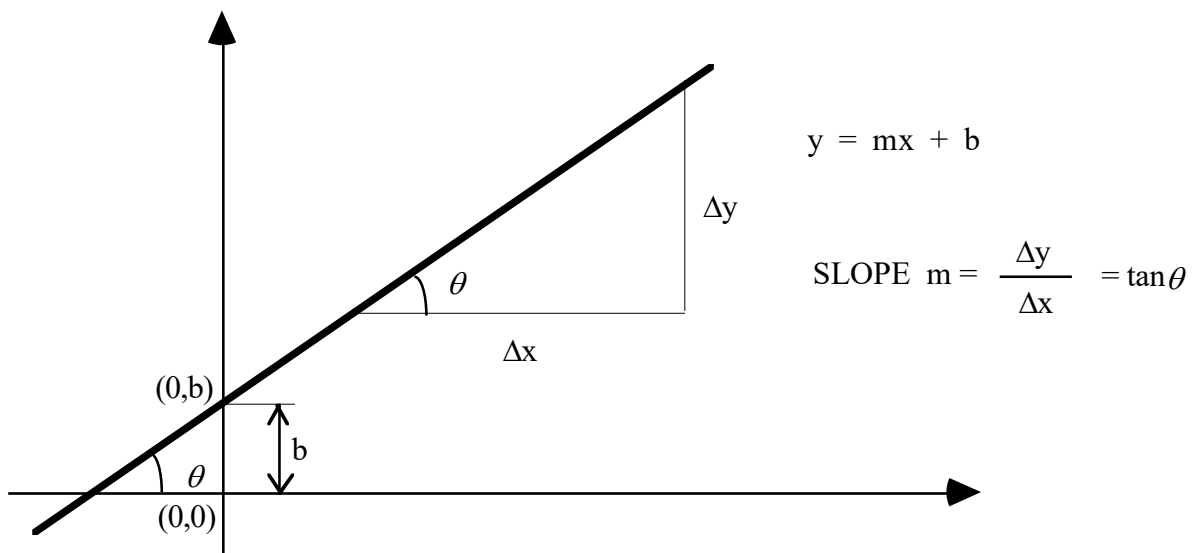
Write an expression for the circumference of the circle. $\underline{\hspace{10em}}$

19. The radius of a cylinder is R and its height is h .

Write an expression for the volume of the cylinder. $\underline{\hspace{10em}}$

Part 5. The Straight Line Graph

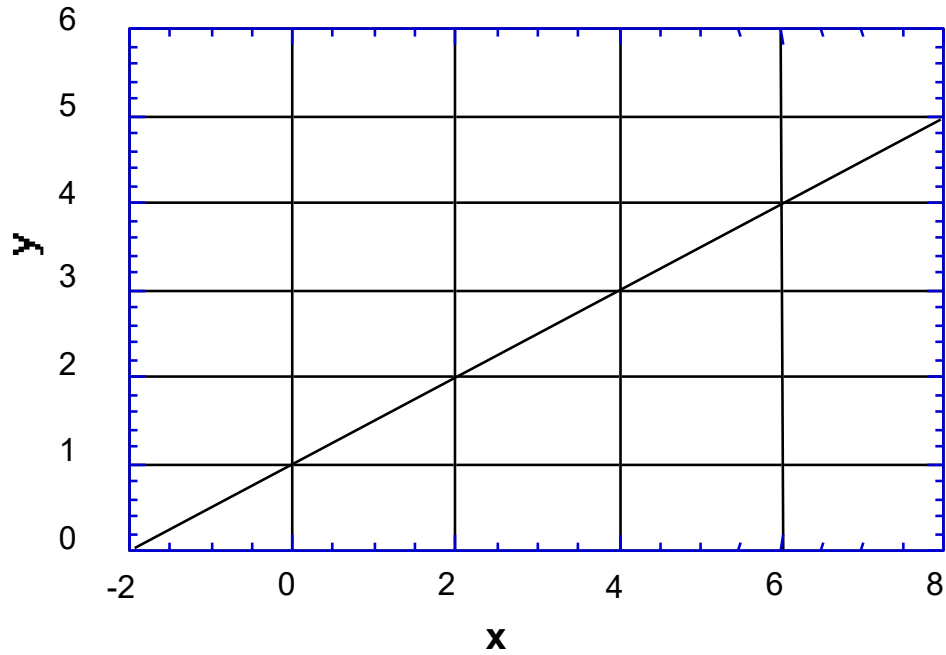
If the relation between x and y is given by: $y = mx + b$, then it may be pictured by a straight line on the y (vertical axis) versus x (horizontal axis) graph. The parameter b , called the *y-intercept*, represents the value of y for $x = 0$. The parameter m is equal to the *slope* of the straight line and is also equal to the tangent of the angle that the line makes with the x -axis.



Sometimes it is not possible to read the value of b directly from the graph. In that case, b has to be calculated. First, find the slope m and then select any point on the straight line and read

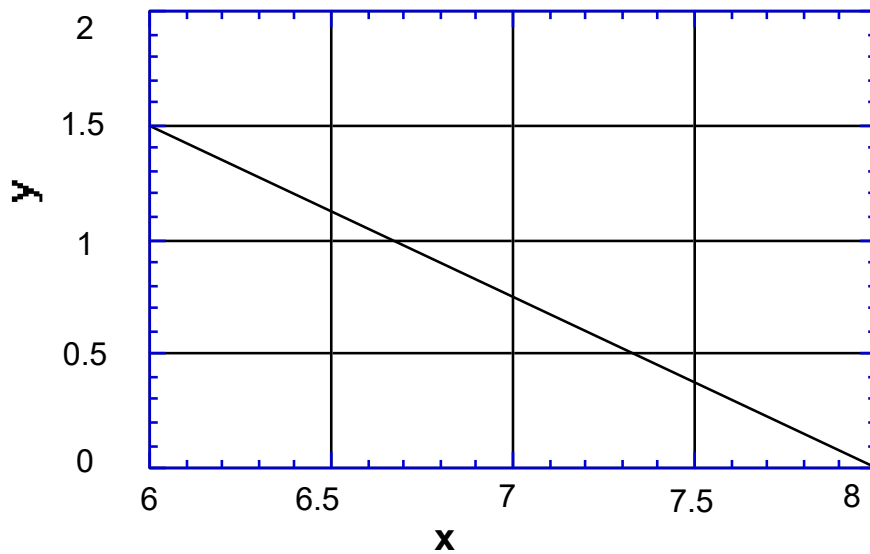
x and y values for that point. Substituting m , x , and y into the straight-line equation, you will be able to calculate the value of the y-intercept b ($b = y - mx$).

20. From the graph below, find the slope m and the y-intercept b .



$m =$ _____ $b =$ _____

21. From the graph below, find the slope m and the y-intercept b .



$m =$ _____ $b =$ _____

22. The following data were collected during measurements of the applied force as a function of displacement for a spring.

Δx (m)	F (N)
0.05	0.81
0.10	1.52
0.15	2.12
0.20	2.81
0.25	3.75

Using the data from this table, prepare a simple graph showing force F versus displacement Δx . The expression: 'force versus displacement' means that the force values should be on vertical (or y -) axis and the displacement should be on the horizontal (or x -) axis, not the other way around. Use Microsoft Excel to prepare the graph. Make sure to label both axes and add title to the graph. Do not forget to include units in the axis label.

Next, calculate the straight line fit for the five data points on your graph (or chart as it is called in Excel). Activate the option "Display Equation on chart" and copy values for slope m and the y -intercept b here.

The last step is to increase the number of decimal places in the trendline equation from the default two decimal places to three. Use option "Format Trendline Label...". Next, select "Label Options" and category "Number" and change the number of decimal places to three.

Write the values of the slope m and y -intercept b below.

$$m = \underline{\hspace{10em}} \qquad b = \underline{\hspace{10em}}$$