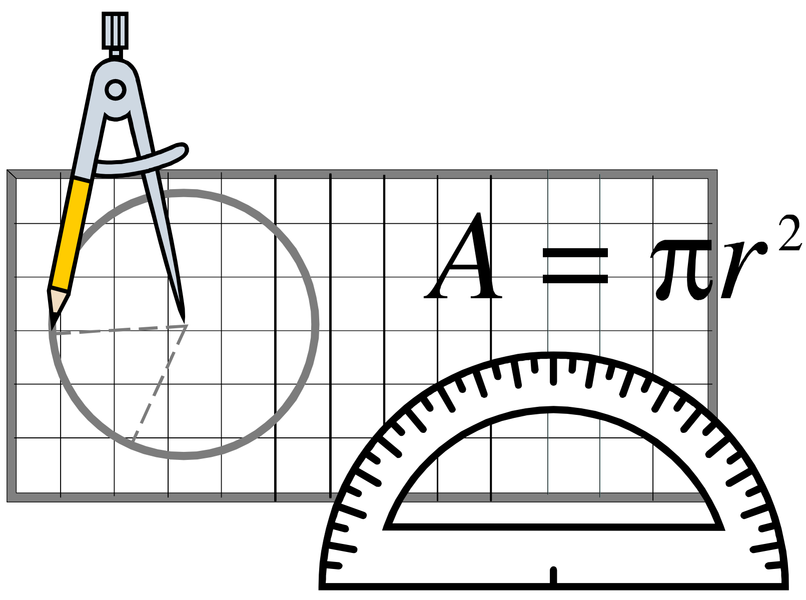
Part B

Intermediate Level

(Up to the end of Math 034)



Signed Numbers

Review

Many situations in the world are represented by negative quantities. For example, temperatures below zero, an overdrawn bank account, etc. Mathematically we use signed numbers, i.e. positive and negative numbers. Addition, subtraction, multiplication, and division can be carried out using signed numbers. A summary of the rules follows:

Rules for Adding and Subtracting Signed Numbers

The sum of positive numbers is positive.

$6 + 7 = 13$

The sum of negative numbers is negative.

$(-2) + (-3) = -5$

When adding positive and negative numbers, find the difference and take the sign of the larger.

$(-4) + 3 = -1$

When subtracting positive and negative numbers, change the sign of the number being subtracted and proceed as in addition. This is also referred to as "adding the opposite."

$5 - (-2) = 5 + 2 = 7$

Rules for Multiplying Signed Numbers

$+ \times + \ = \ +$	positive × positive = positive
$- \times - \ = \ +$	negative × negative = positive
$- \times + \ = \ -$	negative × positive = negative

Examples

$5 \times (-3) \times (-2) = 30$

$(-1) \times (-2) \times (-3) \times (-4) = 24$

$(-2) \times (-3) \times (-4) = -24$

Rules for Dividing Signed Numbers

+ ÷ + = +	positive ÷ positive = positive
– ÷ – = +	negative ÷ negative = positive
– ÷ + = –	negative ÷ positive = negative
+ ÷ – = –	positive ÷ negative = negative

Examples

$8 \div 4 = 2$

$(-6) \div (-3) = 2$

$(-12) \div 3 = -4$

$8 \div (-2) = -4$

Exercises

Answers on page B 30

1. $5 + (-2) =$ ____________
2. $(-3) - (-4) =$ ____________
3. $(-2) + (-8) =$ ____________
4. $(-5) \times 2 =$ ____________
5. $(-8) \times (-4) =$ ____________
6. $16 \div (-4) =$ ____________
7. $(-24) \div (-3) =$ ____________
8. $(-3) + (-2) + (-4) =$ ____________
9. $2 \times (-3) + 5 \times (-4) - 5 =$ ____________
10. $(-15) \div (-3) =$ ____________

Intermediate Level Algebra

Order of Operations

Remember the acronym BEDMAS for the order of operations. The letters stand for:

Brackets or parenthesis	
Exponents	
Division **M**ultiplication	left to right
Addition **S**ubtraction	left to right

This is an internationally agreed-upon system for dealing with multiple operations.

Examples

1. **Calculate**: $2-3(3-5)$

Solution	$2-3(3-5)$
Step 1: subtract $3-5$ within the brackets	$=2-3(-2)$
Step 2: multiply $3(-2)$	$=2-(-6)$
Step 3: subtract $2-(-6)$	$=2+6$
Step 4: add $2+6$	$=8$

2. **Calculate**: $8^2-3^2\times10\div(-2)$

Solution	$8^2-3^2\times10\div(-2)$
Step 1: calculate 8^2 and 3^3 (exponents)	$=64-27\times10\div(-2)$
Step 2: multiply 27×10	$=64-270\div(-2)$
Step 3: divide $-270\div(-2)$	$=64+135$
Step 4: add $64+135$	$=199$

3. **Calculate**: $2(3+4)-5\times\frac{1}{2}$

Solution $2(3+4)-5\times\frac{1}{2}$

Step 1: add 3 + 4 in brackets $=2(7)-5\times\frac{1}{2}$

Step 2: multiply 2 (7) $=14-5\times\frac{1}{2}$

Step 3: multiply $5\times\frac{1}{2}$ $=14-\frac{5}{2}$

Step 4: subtract $14-\frac{5}{2}$ $=11\frac{1}{2}$

Exercises

Answers on page B 30

Calculate the following.

11. $9+2\times 8=$

12. $9\times 8+7\times 6=$

13. $4\times 5^2=$

14. $(12-8)-4=$

15. $15(4+2)=$

16. $8\times 2-(12-0)\div 3-(5-2)=$

17. $\frac{80-6^2}{9^2+3^2}=$

18. $32-8\div 4-2=$

19. $95-2^3\cdot 5\div(24-4)=$

20. $1000\div 100\div 10=$

Solving Equation Review

Most simple equations can be solved by using a simple approach.

What you do to one side of an equation you must do to the other.

Remember these simple guidelines:

1. Clear fractions by multiplying by the denominator.
2. You can add or subtract a quantity from **both** sides of the equation.
3. You can divide every term by whatever is in front or behind what you are solving for.

Examples

Solve $x+4=12$ *subtract 4 from both sides*

$$x=12-4$$
$$x=8$$

Solve $2x+3=15$ *subtract 3 from both sides*

$$2x=15-3$$
$$2x=12$$
$$x=\frac{12}{2}$$ *divide both sides by 2*
$$x=6$$

Solve $\frac{3}{4}x+5=8$ *clear the fraction by multiplying all terms by 4*

$$(4)\frac{3}{4}x+(4)5=(4)8$$

$$3x+20=32$$ *subtract 20 from both sides*

$$3x=32-20$$

$$\frac{3x}{3}=\frac{12}{3}$$ *divide both sides by 3*

$$x=4$$

Equations involving negative numbers

Solve $3x-7=-13$ *add 7 to both sides*

$$3x=-13+7$$

$$3x=-6$$ *divide both sides by 3*

$$x=\frac{-6}{3}$$

$$x=-2$$

Solve $4(x+6)=16$ *distribute 4 to both terms in the brackets*

$$4x+24=16$$ *subtract 24 from both sides*

$$4x=16-24$$

$$4x=-8$$ *divide both sides by 4*

$$\frac{4x}{4}=\frac{-8}{4}$$

$$x=-2$$

Solve $12=\frac{1}{2}\ (3-x)$ *clear the fraction by multiplying all terms by 2(careful here)*

$$(2)12=(2)\frac{1}{2}(3-x)$$

$$24=(3-x)$$ *subtract 3 from both sides*

$$24-3=3-3-x$$

$$21=-x$$ *divide both sides by* -1

$$\frac{21}{-1}=\frac{-x}{-1}$$

$$-21=x \quad x=-21$$

Exercises *Answers on page B 30*

Simplify if required, then solve each equation

21. $x+8=12$

22. $2x-5=17$

23. $5x+8=-42$

24. $4x+2=3x-8$

25. $6x-12=2x$

26. $5(x-3)=3x+1$

27. $\frac{2}{3}(x+4)=8$

28. $\frac{1}{4}(x-2)=3(x-3)$

Problems Involving Algebraic Equations

Example 1

The sum of two consecutive **even** numbers is 30. Find the numbers.

Examples of even numbers are 6, 8, 10, etc

Examples of odd numbers are 3, 5, 7, etc

Let the 1st number = x

then the 2nd number = $x + 2$ (+ 2 because +1 would make the next number an odd number)

$$\begin{aligned} \text{1st number} + \text{2nd number} &= 30 \\ x + (x+2) &= 30 \\ 2x + 2 &= 30 \\ 2x &= 30 - 2 \\ 2x &= 28 \\ x &= 14 \end{aligned}$$

1st number is 14, 2nd number is 16

Example 2

A father and son have a combined age of 78 years. The father is twice as old as his son. How old is the father and how old is the son.

Son's age = x

Father's age = 2x

2x + x = 78

3x = 78

x = 26

Son is 26 years old and the father is 2 · 26 = 52 years old.

Exercises

Answers on page B 30

Solve each problem by identifying what *x* represents, then writing an algebraic equation and then solving the equation. (Remember to show your algebraic expressions as well as the answer.)

29. Jim ran 2 km less than Steven. They ran a total distance of 12 km. How far did each person run?

    Let Jim's distance =

    Then let Steve's distance =

30. The sum of two numbers is 22. The larger number is four more than the smaller. What are the two numbers?

31. Mary is twice as old as her daughter. The sum of their ages is 66 years. How old is Mary and how old is her daughter?

32. A ribbon is cut into two pieces. One piece is 10 metres longer than the other. How long is each piece if the ribbon was 22 metres long?

33. John weighs 2.5 kg less than Jim. The sum of their weights is 121.5 kg. What does each person weigh?

Manipulating Formulas

Formula manipulation is often useful to rearrange a formula to solve for an unknown variable. To solve a formula for a given variable you must isolate the variable on one side of the equals sign by removing all other terms from the same side.

Remember that formulas are equations. Whatever operations you perform on one side of the equals sign must also be performed on the other side. Use the same principles in solving that you use for any other equations.

Some **guidelines** to follow when rearranging formulas are:

1. Remove any fractions by multiplying each term by the lowest common denominator.

2. Think about **BEDMAS** in reverse.
   - move any term added or subtracted first (addition is the opposite of subtraction)
   - divide by the term in front of or behind the variable you are solving for (division is the opposite of multiplication)
   - if you have a variable squared, then take the $\sqrt{\ }$ of the variable and the $\sqrt{\ }$ of the other side of the = . Square rooting $\left(\sqrt{x}\right)$ is the opposite of squaring (x^2).

Example 1

B = EC + D is a formula. Solve for C

Solution

To solve the formula for C, you need to get C alone on one side.

Solve for C $B = EC + D$

Subtract D from each side $B - D = EC + D - D$

$B - D = EC$

Divide both sides by E $\dfrac{B-D}{E} = \dfrac{EC}{E}$

$\dfrac{B-D}{E} = C$ written as $C = \dfrac{B-D}{E}$

Example 2

$A = \frac{1}{2}bh$ finds the measure of the area (*A*) of a triangle with base (*b*) and height (*h*).

Solution

To solve for b move *A* to the right side of the equal sign and $\frac{1}{2}bh$ to the left side of the equal sign to *prepare for b =*

$$\frac{1}{2}bh = A$$

Multiply both sides by 2 to get rid of the fraction

$$2\left(\frac{1}{2}\text{bh}\right) = 2\text{A}$$

$$bh = 2A$$

Divide both sides by *h*

$$\frac{\text{bh}}{\text{h}} = \frac{2\text{A}}{\text{h}}$$

$$\text{b} = \frac{2\text{A}}{\text{h}}$$

Example 3

$A = \pi r^2$ is the formula for the area (*A*) of a circle where *r* is the radius and π is a constant.

Solution

Solve for *r*

$$\pi r^2 = A$$

Divide both sides by π

$$\frac{\pi \text{r}^2}{\pi} = \frac{\text{A}}{\pi}$$

$$\text{r}^2 = \frac{\text{A}}{\pi}$$

Take the square root of both sides

$$\sqrt{\text{r}^2} = \sqrt{\frac{\text{A}}{\pi}}$$

$$r = \sqrt{\frac{A}{\pi}}$$

Exercises *Answers on page B 30*

Solve for the indicated letter.

34. $y = a - x$, for x

35. $y = q - x$, for q

36. $By = Ax$, for y

37. $y = bx + c$, for x

38. $P = \dfrac{a+b}{2}$, for a

39. $P = \dfrac{ab}{c}$, for c

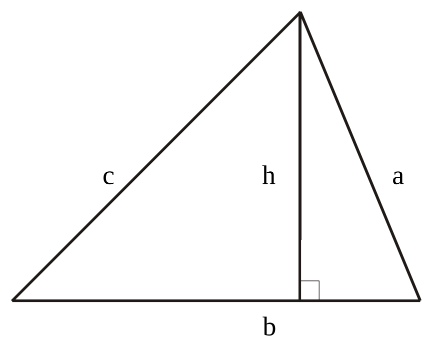
End of Review for Math 033

Perimeter, Area and Volume

Review of Triangles

A triangle is a closed geometric figure with three sides, in which each side is a straight line segment.

Let *a*, *b*, and *c* be the lengths of the sides of a triangle and *h* be the height (the distance from one side to the opposite vertex).



The **perimeter** of a triangle is the sum of the lengths of the sides.

$P = a + b + c$

The **area** of a triangle is one-half the base times the height.

$$A = \frac{1}{2} b\, h$$

Example

The **perimeter** of a triangle with sides $a = 2$, $b = 4$ and $c = 3$ is

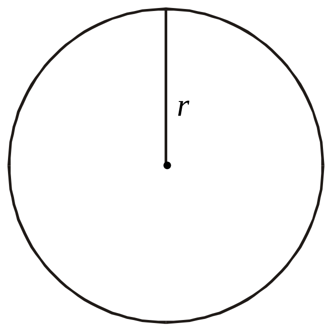
$P = 2 + 4 + 3 = 9$

The **area** of a triangle with base = 4 and height = 2 is

$$A = \frac{1}{2} \times 4 \times 2 = 4$$

Review of Circles

Let r = radius, C = circumference, d = diameter, A = area, $\pi = 3.14$



The **radius** of a circle is the distance r from the centre to any point on the circle. The **diameter** is the distance d across the circle or twice the radius.

$d = 2\,r$

The **circumference** (distance around) of a circle is π times the diameter.

$C = \pi\, d = 2\,\pi\, r$

The **area** of a circle is the square of the radius (r^2) times π.

$A = \pi\, r^2$

Example

A circle with radius = 5 has the following diameter, circumference and area:

$d = 2r$ $\quad$ $d = 2 \times 5 = 10$

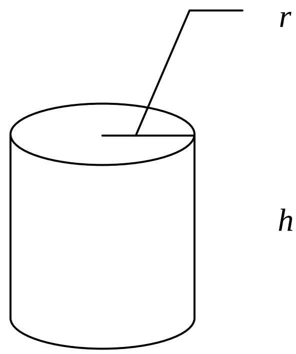
$C = \pi\, d$ $\quad$ $C = \pi 10 = 31.416$

$A = \pi\, r^2$ $\quad$ $A = \pi \times 5^2 = 25\,\pi = 78.54$

Review of Volume

The volume of a cylinder is the height times the area of the base.

$V = \pi r^2 h$



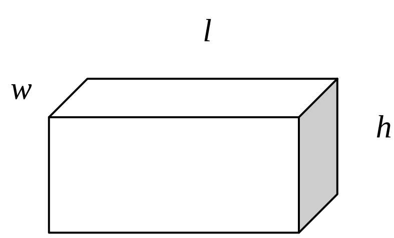
Example

If a cylinder has height = 10 and radius = 5 then the volume is

$V = \pi (5)^2 \times 10 = 250\pi = 250 \times 3.14 = 785$

The volume of a box is the length times the width times the height.

$V = l\,w\,h$



Example

If a box has length = 10, width = 6 and height = 5, then the volume is

$V = 10 \times 6 \times 5 = 300$

Volume is expressed in cubic measurements, cm^3, m^3, km^3 etc.

Exercises *Answers on page B 31*

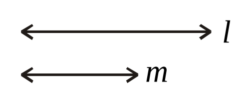
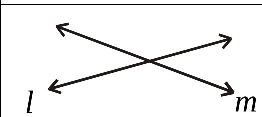
40. George is making a rectangular patio that measures 6 m by 8.5 m and is .25 m deep. How many cubic metres (m^3) concrete does he need?

41. What is the diameter of a circle that has an area of 706.5 square cm (cm^2)?

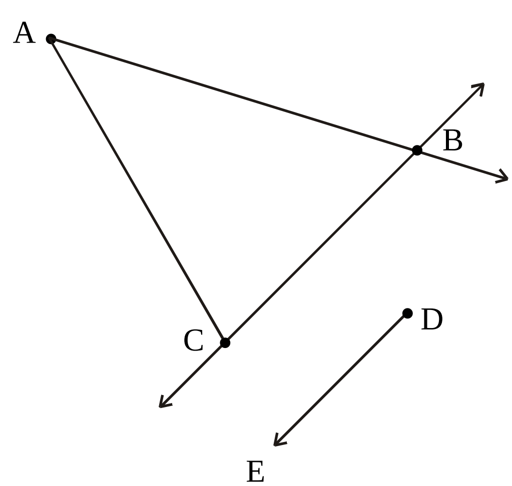
42. If the circle in question 41. formed the base of a cylinder 16 cm high, what would be the volume of the cylinder?

Intermediate Level Geometry

Review of Points, Lines, Segments, Rays

Term	**Description**	**Symbol**	**Figure**
Point	has location only	•	• A
Line	a set of points extending endlessly in **both** directions, has length but no thickness	$\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$ or m	
Segment	a part of a line consisting of two endpoints and all the points in between	$\overline{AB}$ or $\overline{BA}$	
Ray	a part of a line with one endpoint that extends endlessly in **one** direction. (Note that the starting point is always given first.)	$\overrightarrow{AB}$	
Parallel lines	lines in the same plane that **do not** intersect	$l \parallel m$ *or* $m \parallel l$	
Intersecting lines	lines that **do** intersect and have one point in common	no symbol	

Example



$\overline{AC}$ segment

$\overleftrightarrow{BC}$ line

$\overrightarrow{AB}$ ray

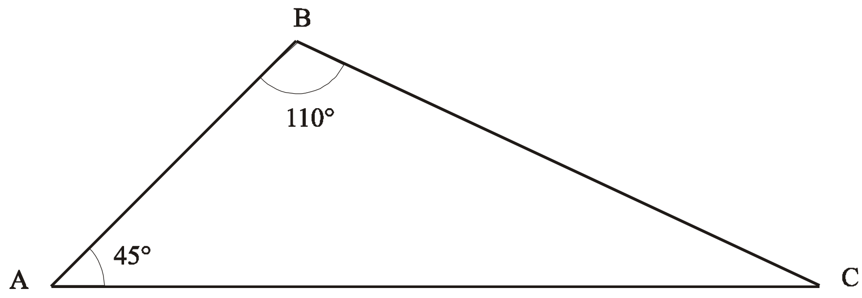
• D a point

$\overrightarrow{DE}$ a ray from D parallel to $\overleftrightarrow{BC}$

Intermediate Level Geometry

The sum of the three angles of any triangle is 180°. Knowing this you can find the size of a missing angle.

Example



$\angle ABC = 110°$
$\angle BAC = 45°$

Then:

$$110° + 45° + \angle BCA = 180°$$
$$155° + \angle BCA = 180°$$
$$\angle BCA = 180° - 155°$$
$$\angle BCA = 25°$$

Pythagorean Theorem

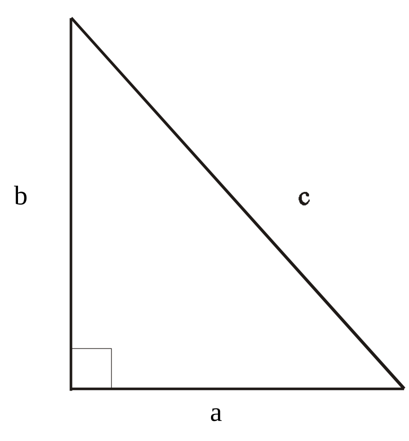
In a right angled triangle the square of the hypotenuse equals the sum of the squares of the other two sides. The ***hypotenuse*** *is the side opposite the 90° angle.*

Example

$c^2 = a^2 + b^2$

$a = 4$
$b = 7$

Find the length of side c.



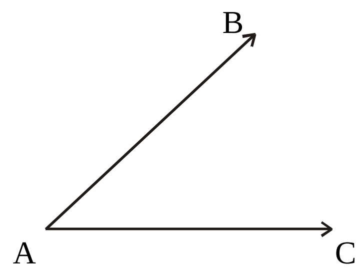
$$c^2 = 7^2 + 4^2$$
$$c^2 = 49 + 16$$
$$c^2 = 65$$
$$c = \sqrt{65}$$
$$c = 8.06$$

Exercises

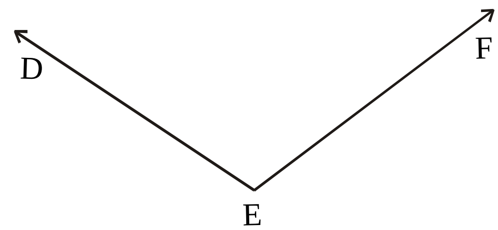
Answers on page B 31, 32

Use a protractor to measure the following angles. (Make sure you read the correct scale on your protractor.)

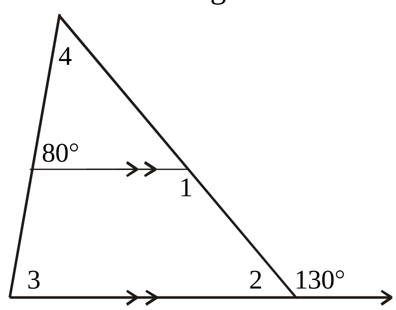
43.

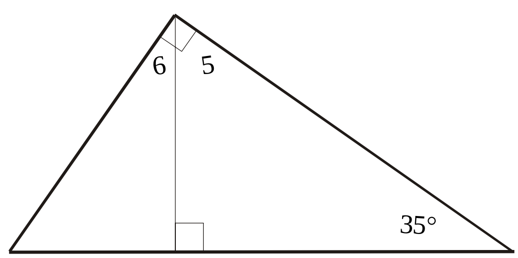


44.



45. In the drawings below, determine the measure of each of the angles identified by numbers 1 through 6 **without using a protractor**.





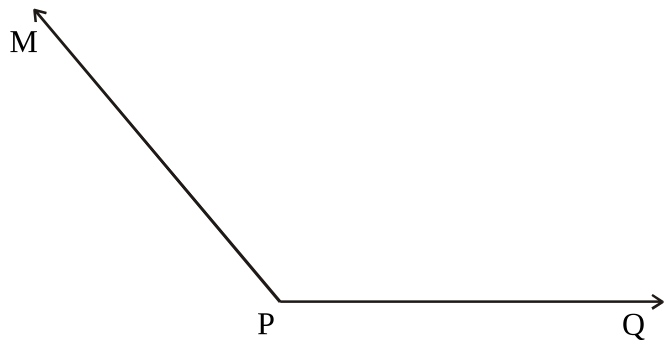
Draw and label the following angles in the space provided

46. $\angle ABC = 50°$

47. $\angle DEF = 220°$

Bisect means to divide into two equal parts

48. Use only a compass and a ruler and show all construction lines necessary to bisect the angle ∠MPQ.



49. Use only a compass and a ruler and show the construction necessary to bisect the line segment $\overline{CD}$.

50. Use only a compass and a ruler to construct a triangle with sides of 6 cm, 4 cm and 4 cm in the space below.

51. How long a ladder would be needed to reach a window that is 4 m off the ground, if the base of the ladder is 3 m from the wall? (Use the Pythagorean Theorem.)

Powers and Exponents

Review

A little number placed at the upper right of a number is called a power or exponent. A power is an instruction to multiply the number (or base) by itself, a certain number of times.

number or base → $\mathbf{2^3}$ ←**power or exponent**

2^3 is read as	two to the third power *or* two to the power of three, *or* two cubed	$2^3 = 2 \times 2 \times 2 = 8$
5^2 is read as	five to the power of two *or* five squared	$5^2 = 5 \times 5 = 25$
3^4 is read as	three to the power of four	$3^4 = 3 \times 3 \times 3 \times 3 = 81$
10^5 is read as	ten to the power of five	$10^5 = 10 \times 10 \times 10 \times 10 \times 10 = 100{,}000$

Note that the base of 1 to any power equals 1. $1^4 = 1 \times 1 \times 1 \times 1 = 1$

The power of 1 is understood for any number but not written for simplicity's sake. For example:

$8^1 = 8$ and $10^1 = 10$

Decimals

Decimals can have powers. These are calculated in the same way as whole numbers.

$0.03^2 = 0.03 \times 0.03 = 0.0009$

$2.5^3 = 2.5 \times 2.5 \times 2.5 = 15.625$

Fractions

To take a **fraction** to a power, it is necessary to use a bracket around the entire fraction.

$$\left(\frac{2}{3}\right)^3 = \frac{2\times2\times2}{3\times3\times3} = \frac{8}{27}$$

$$\frac{2^3}{3} = \frac{2\times2\times2}{3} = \frac{8}{3}$$

Notice the difference between $\left(\frac{2}{3}\right)^3$ and $\frac{2^3}{3}$

Scientific Notation

Very large numbers or very small numbers, often encountered in science, are usually written using a power of the base 10 to make the number more easily and accurately read. Such numbers are said to be written in the scientific notation.

Examples

$$\textit{decimal notation} \rightarrow 265\,000 = 2.65\times10^5 \leftarrow \textit{scientific notation}$$
$$\textit{decimal notation} \rightarrow 0.000\,000\,14 = 1.4\times10^{-7} \leftarrow \textit{scientific notation}$$

Exercises

Answers on page B 33

Convert each number to decimal notation

52. 3.2×10^4

53. 6.07×10^7

54. 2.1×10^{-3}

55. 4.5×10^{-5}

Convert each number to scientific notation

56. 5 320 000

57. 0.005 3

58. 203 000

59. 0.05

Operations with Powers and Square Roots

Operations with Powers—Review

Remember the following rules:

If you have a common base number:

$a^x \times a^y = a^{x+y}$	when multiplying, add the exponents
$\frac{a^x}{a^y} = a^{x-y}$	when dividing, subtract the exponents
$(a^x)^y = a^{xy}$	when raising to another power, multiply the exponents
$(a^x b^y)^z = a^{xz} b^{yz}$	when raising several powers to another power, multiply the appropriate exponents.

Examples:

$5^4 + 5^7 = 5^{11}$

$\frac{6^3}{6^8} = 6^{3-8} = 6^{-5} \ or \ \frac{1}{6^5}$

$(2^3)^6 = 2^{3x6} = 2^{18}$

$(2x^3)^4 = (2^1 x^3)^4 = 2^4 x^{12} \ or \ 16x^{12}$

Square Roots—Review

The square root ($\sqrt{\ }$) of a number means to find a number which when multiplied by itself is the original number.

As 5 × 5 = 25, then the square root of 25 is 5 or $\sqrt{25} = 5$

You should know the following:

$\sqrt{1} = 1$	$\sqrt{4} = 2$	$\sqrt{9} = 3$	$\sqrt{16} = 4$
$\sqrt{25} = 5$	$\sqrt{36} = 6$	$\sqrt{49} = 7$	$\sqrt{64} = 8$
$\sqrt{81} = 9$	$\sqrt{100} = 10$	$\sqrt{121} = 11$	$\sqrt{144} = 12$

Fractions

Notice the difference between

$\frac{\sqrt{25}}{4} = \frac{5}{4}$ and $\sqrt{\frac{25}{4}} = \frac{5}{2}$

Decimals

Notice that the square root of the decimal 0.09 is 0.3 because

$0.3 \times 0.3 = 0.09$

Also, $\sqrt{0.04} = 0.2$ $\sqrt{0.0144} = 0.12$ $\sqrt{0.25} = 0.5$

Square Roots That Are Not Whole Numbers

If we are trying to find the square root of 6, there is no whole number, that when multiplied by itself, is equal to 6. The square root of most numbers is a decimal which goes on forever and doesn't repeat. A calculator will round off these square roots to either 8 or 10 decimal places. You can use a calculator to find these square roots. Always round off the answer to the number of decimal places required.

$\sqrt{6} = 2.45$ (to 2 decimal places) $\sqrt{10} = 3.16$

$\sqrt{91} = 9.54$ $\sqrt{2} = 1.41$

Square Roots Using Variables

As $x^3 \times x^3 = x^6$, then the square root of x^6 is x^3 or $\sqrt{x^6} = x^3$

Consider $\sqrt{x^4}$ as $\sqrt{x \cdot x \cdot x \cdot x}$ now how many groups of x·x can you make out of x·x·x·x?

2 groups right? Therefore, $\sqrt{x^4} = x^2$

Consider $\sqrt{y^8}$ How many groups of y^2 are there? y^4 right?

What about $\sqrt{\frac{36x^5}{16}}$? That gives $\frac{6x^2}{4} with \sqrt{x}$ left over. This equals $\frac{6x^2}{4}\sqrt{x}$

Exercises

Answers on page B 33

Simplify the following

60. $x^6 \cdot x^2$

61. $\dfrac{3^5}{3^2}$

62. $\dfrac{(2x)^6}{(2x)^5}$

63. $(x^3)^2$

64. $(-3y^2)^3$

65. $\left(\dfrac{ab}{c}\right)^3$

Find the following

66. 2^2

67. 5^3

68. 3^3

Evaluate the following

69. $\sqrt{64}$

70. $\sqrt{121}$

Evaluate the following (round off to 2 decimal places)

71. $\sqrt{13}$

72. $\sqrt{31}$

Find the following

73. $\sqrt{\dfrac{25x^8}{9}}$

74. $\sqrt{x^2 y^2}$

75. $\sqrt{49y^{10}}$

76. $\sqrt{\dfrac{1}{4}t^2}$

Intermediate Level Graphing

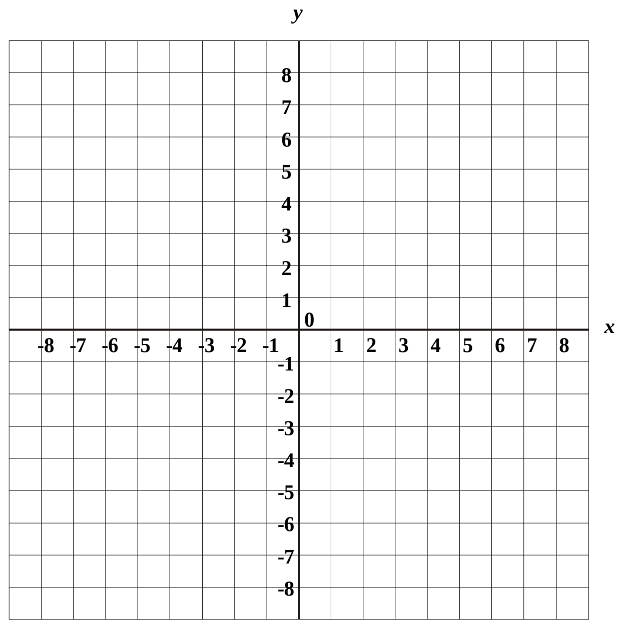
Graphing of Linear Equations

Answers on page B 33,34

Graph each of the following.

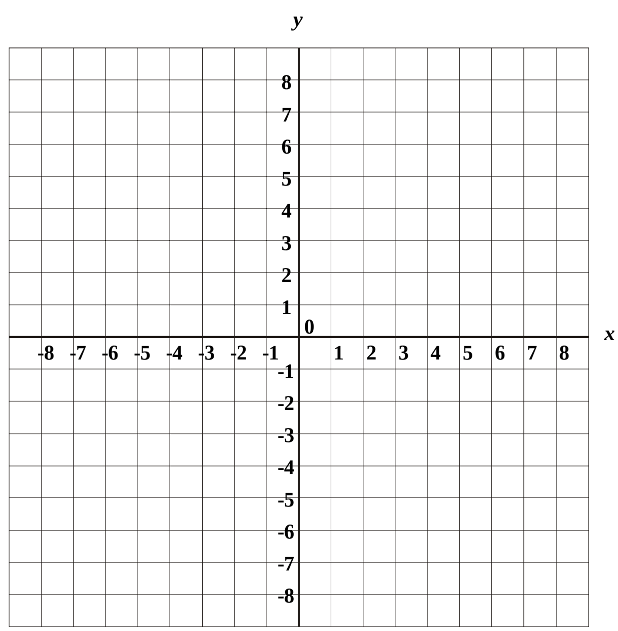
77. $y = x - 4$

x	y



78. $y = 2x + 5$

x	y



Intermediate Level Trigonometry

The following trigonometric ratios apply to a **right angled** triangle:

$$\sin \text{ of angle } = \frac{\text{length of side opposite (across from) the angle}}{\text{length of hypotenuse of triangle}} \quad \text{or} \quad s = \frac{o}{h}$$

$$\cos \text{ of angle } = \frac{\text{length of side adjacent to (beside) angle}}{\text{length of hypotenuse of triangle}} \quad \text{or} \quad c = \frac{a}{h}$$

$$\tan \text{ of angle} = \frac{\text{length of side opposite the angle}}{\text{length of side adjacent to angle}} \quad \text{or} \quad t = \frac{o}{a}$$

S O H C A H T O A

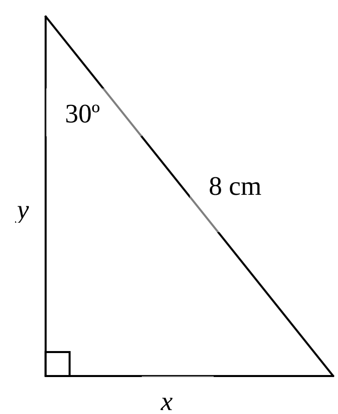
Using these ratios we can find missing measurements in a triangle.
You need to use tables of Trigonometric Ratios or a scientific calculator.

Find the lengths of two sides using a trigonometric ratio

Find *x* and *y* in the triangle.

$$\sin 30° = \frac{o}{h}$$

$$\frac{x}{8 \text{ cm}} = \sin 30°$$
$$x = \sin 30° \times 8 \text{ cm}$$
$$x = 0.5 \times 8 \text{ cm}$$
$$x = 4 \text{ cm}$$



$$\cos 30° = \frac{a}{h}$$

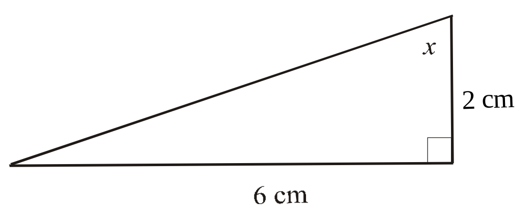
$$\frac{y}{8 \text{ cm}} = \cos 30°$$
$$y = \cos 30° \times 8 \text{ cm}$$
$$y = 0.866 \times 8 \text{ cm}$$
$$y = 6.928 \text{ cm}$$

Find an angle using a trigonometric ratio

Find the angle marked *x* in the triangle.

$$\tan x = \frac{o}{a}$$

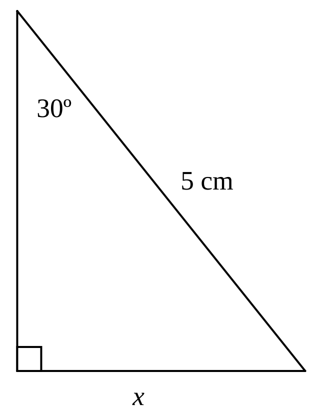
$$\tan x = \frac{6}{2}$$
$$\tan x = 3$$
$$x = 71.6°$$



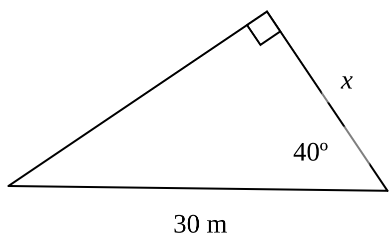
Exercises *Answers on page B 34*

Use trigonometric ratios to find the length of the side or angle indicated in each diagram.

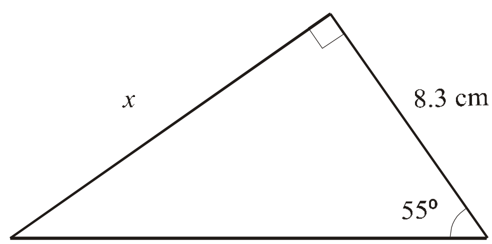
79.



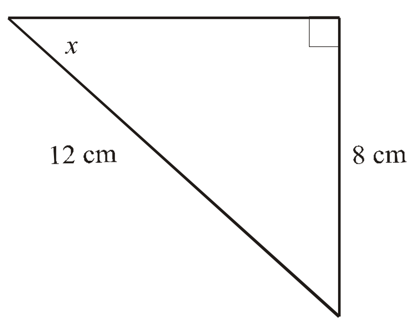
80.



81.



82.



Answers (Math 033)

Signed Numbers

1.	3	2.	1	3.	–10	4.	–10
5.	32	6.	–4	7.	8	8.	–9
9.	–31	10.	5				

Intermediate Level Algebra

11.	25	12.	114	13.	100	14.	0
15.	90	16.	9	17.	$\frac{22}{45}$	18.	28
19.	93	20.	1	21.	4	22.	11
23.	–10	24.	–10	25.	3	26.	8
27.	8	28.	$\frac{34}{11}$ or $3\frac{1}{11}$				

29. $x+(x-2)=12$ Jim ran 5 km and Steven ran 7 km.

30. $x+(x+4)=22$ The numbers are 9 and 13.

31. $2x+x=66$ Mary is 44 and her daughter is 22. (x is the daughter's age)

32. $x+(x+10)=22$ The pieces of ribbon are 6 m and 16 m long.

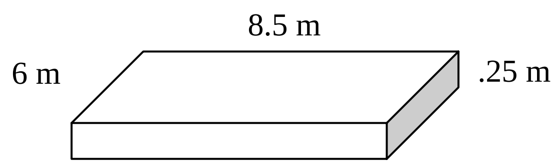
33. $(x-2.5)+x=121.5$ John weighs 59.5 kg and Jim weighs 62 kg.

34.	$x=a-y$	35.	$q=y+x$	36.	$y=\frac{Ax}{B}$	37.	$x=\frac{y-c}{b}$
38.	$a=2P-b$	39.	$c=\frac{ab}{P}$				

Answers (Math 034)

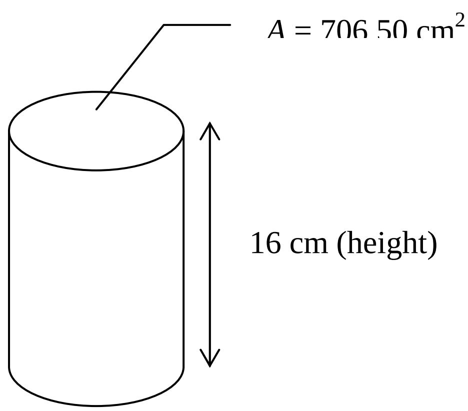
Perimeter, Area and Volume

40. $6 \times 8.5 \times .25 = 12.75\text{ m}^3$



41.
$$\pi r^2 = 706.50$$
$$r^2 = 225$$
$$r = 15$$
$$d = 2r = 30\text{ cm}$$

42.



$$V = A \times h$$
$$V = 706.50 \times 16$$
$$V = 11\,304\text{ cm}^3$$

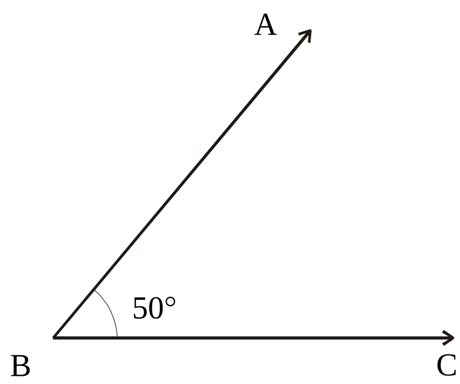
Intermediate Level Geometry

43. 43°

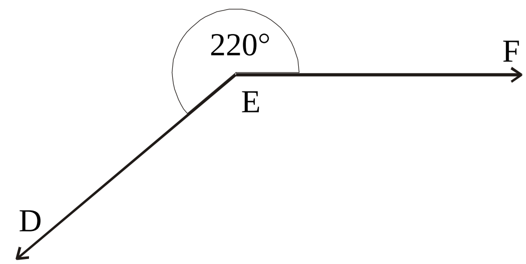
44. 110°

45. ∠1 = 130°, ∠2 = 50°, ∠3 = 80°, ∠4 = 50°, ∠5 = 55°, ∠6 = 35°

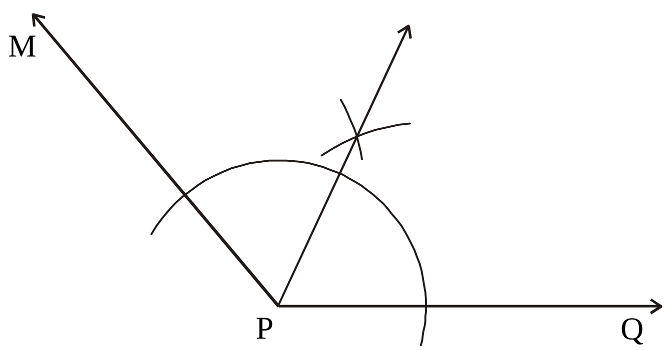
46.



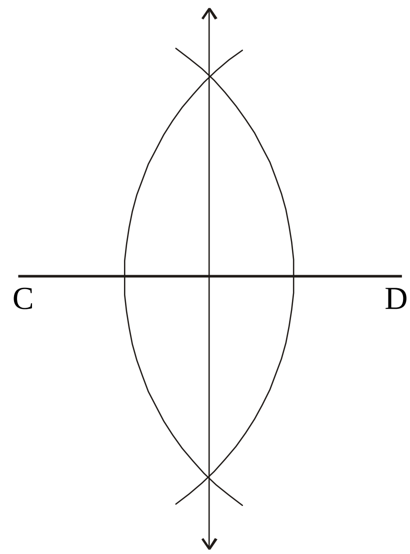
47.



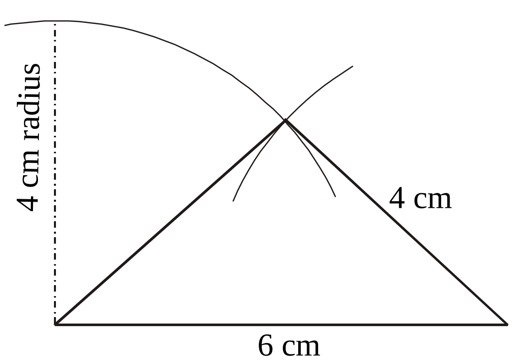
48.



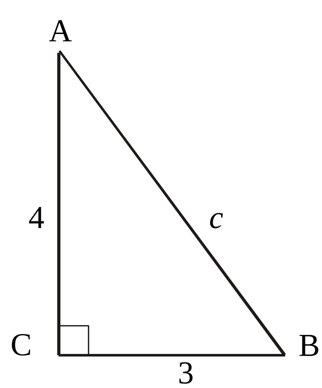
49.



50.



51. $c^2 = 9 + 16$
$c^2 = 25$
$c = 5$ m



Powers or Exponents

52. 32 000
53. 60 700 000
54. 0.002 1
55. 0.000 045
56. 5.32×10^{6}
57. 5.3×10^{-3}
58. 2.03×10^{5}
59. 5.0×10^{-2}

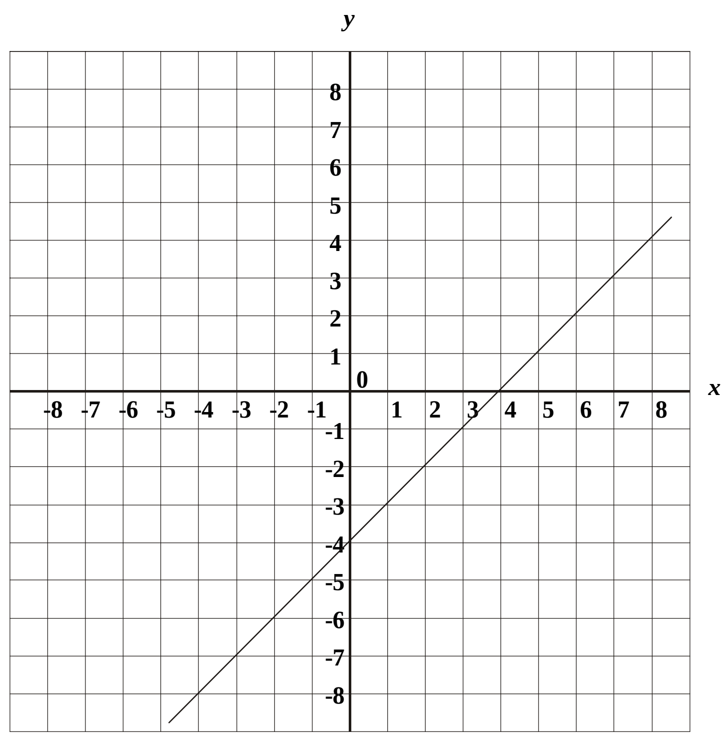
Square Roots

60. x^8
61. 3^3 or 27
62. $2x$
63. x^6
64. $-3^3 y^6$ or $-27y^6$
65. $\dfrac{a^3b^3}{c^3}$
66. 4
67. 125
68. 27
69. 8
70. 11
71. 3.61
72. 5.57
73. $\dfrac{5x^4}{3}$
74. xy
75. $7y^5$
76. $\dfrac{1}{2}t$ or $\dfrac{t}{2}$

Intermediate Level Graphing

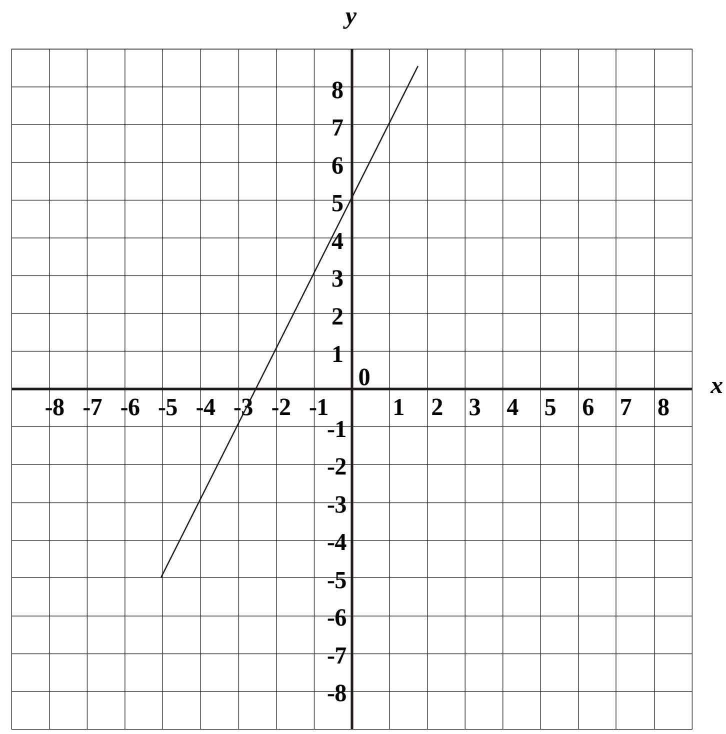
77. $y = x - 4$

x	*y*
0	–4
1	–3
2	–2
3	–1
4	0



78. $y = 2x + 5$

x	y
–2	1
–1	3
0	5
1	7



Intermediate Level Trigonometry

79. $\frac{x}{5} = \sin 30°$ $x = 2.5$ cm

80. $\frac{x}{30} = \cos 40°$ $x = 22.98$ m

81. $\frac{x}{8.3} = \tan 55°$ $x = 11.85$ cm

82. $\sin x = \frac{8}{12}$ $x = 41.8°$