

## Other Graphs

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There are several other types of graphs. These include hyperbolas, circles, growth curves and cubics.

These are shown below.

Hyperbolas

Circles

Exponential  
Functions

Cubics

Summary of  
Graphs

### Hyperbolas

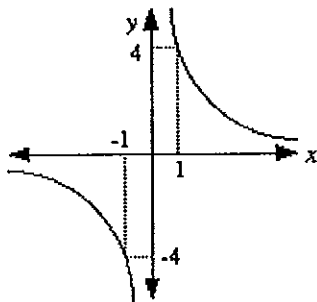
The general equation of a hyperbola is  $xy = c$  or  $y = \frac{c}{x}$

If  $c$  is positive.

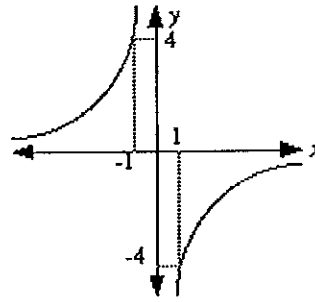
If  $c$  is negative.

e.g.  $xy = 4$

e.g.  $xy = -4$



Graph is in first and third quadrants.



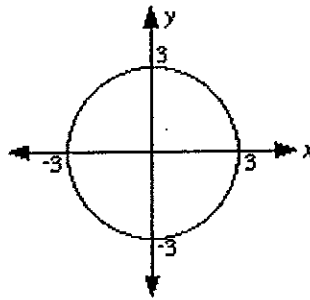
Graph is in second and fourth quadrants.

### Circles

The general equation of a circle is  $x^2 + y^2 = a^2$ , where  $a$  is the radius of the circle.

This relation is not a function, because some of the  $x$ -values have two corresponding  $y$ -values.

e.g.  $x^2 + y^2 = 9$



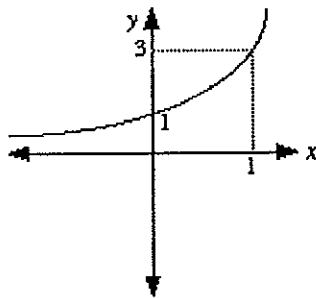
### Exponential Functions or Growth Curves

The general equation is  $y = a^x$

The greater the value of  $a$ , the steeper is the curve.

All growth curves of this type pass through the point  $(0, 1)$

e.g.  $y = 3^x$



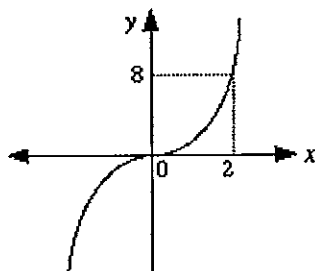
### Cubics

The general equation of a cubic function is  $y = (x - a)(x - b)(x - c)$

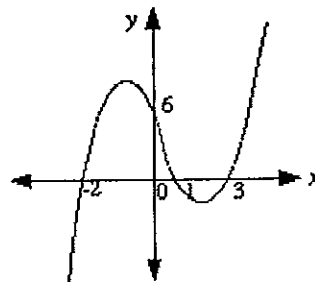
The simplest cubic is  $y = x^3$ .

e.g.

$$y = x^3$$



$$y = (x - 1)(x - 3)(x + 2)$$



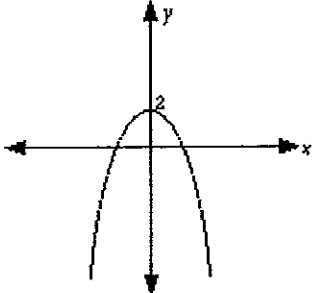
## Summary of Graphs

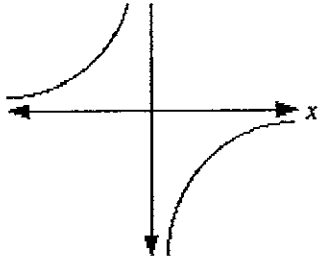
| Type of graph                     | General equation                            | Characteristics  | Example                                    |
|-----------------------------------|---|--|--|
| <b>Straight line</b>              | $ax + by + c = 0$<br>$y = mx + c$           | x and y terms both have exponents of 1                   | $x + 2y = 6$<br>$y = 3x + 4$               |
| <b>Parabola</b>                   | $y = ax^2 + bx + c$<br>$y = a(x - h)^2 + k$ | y term has exponent of 1<br><br>x term has exponent of 2 | $y = x^2 + 4x + 3$<br>$y = 2(x - 3)^2 + 4$ |
| <b>Hyperbola</b>                  | $xy = c$                                    | x and y terms have exponents of 1                        | $xy = 6$                                   |
| <b>Circle</b>                     | $x^2 + y^2 = a^2$                           | x and y terms both have exponents of 2                   | $x^2 + y^2 = 16$                           |
| <b>Growth curve (exponential)</b> | $y = a^x$                                   | x is the exponent  | $y = 5^x$                                  |
| <b>Cubic</b>                      | $y = (x - a)(x - b)(x - c)$                 | x term has exponent of 3                                 | $y = (x - a)(x - b)(x - c)$                |

## Other Graphs

### Unit Test #39

Select your answers to the following 10 questions from the pop-up menus in the right hand column. When you are satisfied with your answers, fill in your name in the space provided below the test, and click the "Submit Test" button. Clicking the "Begin Test Again" button will clear all the answers.

|       |  |  |           |                      |
|-------|--|--|-----------|----------------------|
| Q1:   | Which of the following equations has a circle as its graph ?   | A. $y = x^2 + 4$<br>B. $y^2 + x^2 = 4$<br>C. $y = (x + 4)^2$<br>D. $y = 4^x$             | Answer 1: | <input type="text"/> |
| Q2:   | What is the equation of the following graph?<br> | A. $y = -x^2 - 2$<br>B. $y = x^2 + 2$<br>C. $(x - 2)(2 - x)$<br>D. $y = -x^2 + 2$        | Answer 2: | <input type="text"/> |
| Q3:   | What is the radius of a circle with the equation<br>$x^2 + y^2 = 50$ ?   | A. 50<br>B. $\sqrt{50}$<br>C. 7<br>D. 2500   | Answer 3: | <input type="text"/> |
| Q4:   | What are the x - intercepts of the cubic function<br>$y = (x - 2)(x + 4)(x - 3)$ ?   | A. 2, -4, 3<br>B. -2, 4, -3<br>C. 2, -4, -3<br>D. -2, -4, 3                              | Answer 4: | <input type="text"/> |
| Q5:   | Factorise $x^2 + x - 6$  | A. $(x + 2)(x - 3)$<br>B. $(x + 3)(x - 2)$<br>C. $(x + 6)(x - 1)$<br>D. $(x - 6)(x + 1)$ | Answer 5: | <input type="text"/> |
| Q6:   | Which of the following equations has an exponential or growth curve as its graph?  | A. $y = 2x$<br>B. $y = 2^x$<br>C. $y = x^2$<br>D. $y^2 = 2x$                             | Answer 6: | <input type="text"/> |
| / ▲ y |  |  |           |                      |

|      |  |  |                       |                          |
|------|--|--|-----------------------|--------------------------|
| Q7:  |  <p>Which of the following equations could be shown by the graph above?</p> | <p>A. <math>y = 4^x</math><br/>         B. <math>xy = 4</math><br/>         C. <math>xy = -4</math><br/>         D. <math>y = x^4</math></p>                         | <p>Answer<br/>7:</p>  | <input type="checkbox"/> |
| Q8:  | <p>Which of the following points lie on the graph of <math>y = 2^x</math>?</p>   | <p>A. (1, 0)<br/>         B. (1, 1)<br/>         C. (1, 2)<br/>         D. (1, 4)</p>  | <p>Answer<br/>8:</p>  | <input type="checkbox"/> |
| Q9:  | <p>Which equation has a graph which is a parabola?</p>   | <p>A. <math>y = x - 1</math><br/>         B. <math>y^2 + x^2 = 25</math><br/>         C. <math>y = x^2 - 6x</math><br/>         D. <math>y = 4^x</math></p>          | <p>Answer<br/>9:</p>  | <input type="checkbox"/> |
| Q10: | <p>Which equation is that of a circle centre (0, 0) passing through point (0, 4)?</p>  | <p>A. <math>y = x^2 + 4</math><br/>         B. <math>y^2 + x^2 = 4</math><br/>         C. <math>x^2 + y^2 = 4</math><br/>         D. <math>x^2 + y^2 = 16</math></p> | <p>Answer<br/>10:</p> | <input type="checkbox"/> |

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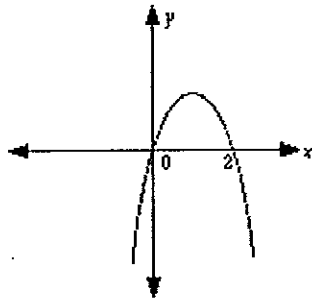
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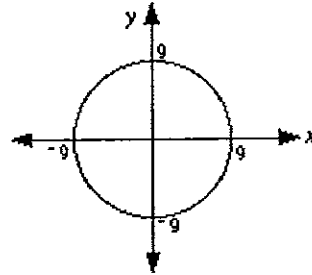
## Other Graphs

1.

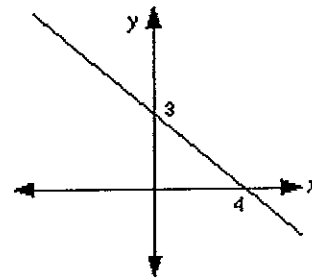
**Graph A**



**Graph C**



**Graph D**



(a) Which diagram shows:

(i) A hyperbola? (ii) A parabola? (iii) A growth curve?

(b) What is the equation of graph D?

(c) Which is the equation of the graph in A?

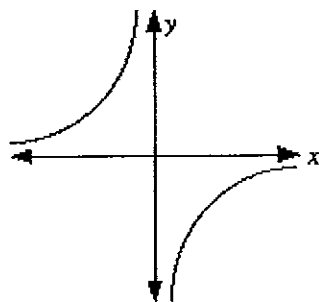
(i)  $y = (x - 2)^2$  (iii)  $y = 2x - x^2$

(ii)  $y = x(x - 2)$  (iv)  $y = -x^2 + 2$

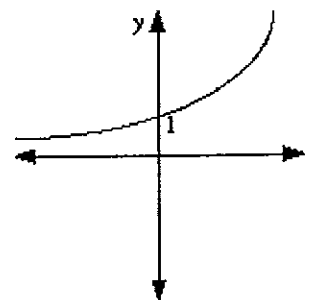
(d) Give a possible equation for the curve in graph B.

(e) What is the equation of the circle in graph C?

**Graph B**



**Graph E**



2. Sketch graphs of the following functions, clearly marking the intercepts.

(a)  $y = 4x$

(b)  $y = 4$

(c)  $x^2 + y^2 = 16$

(d)  $xy = 4$

3. (a) Complete the table of values for the function  $xy = -4$

| x  | y |
|----|---|
| -2 | 2 |
| -1 |   |
| 0  |   |
| 1  |   |
| 2  |   |

(b) Sketch the graph of the function.

(c) What name is given to this type of graph?

4. (a) Complete the table of values for the function  $y = 2^x$

| x  | y    |
|----|------|
| -2 | 0.25 |
| -1 |      |
| 0  |      |
| 1  |      |
| 2  |      |
| 3  |      |

(b) Sketch the graph.

## Other Graphs

1. (a) (i) B (ii) A (iii) E

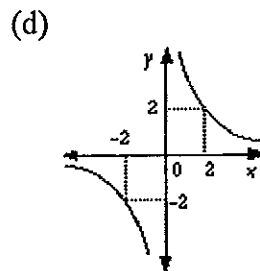
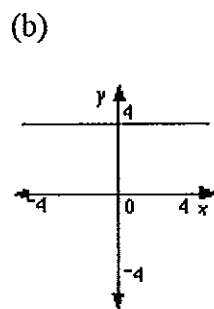
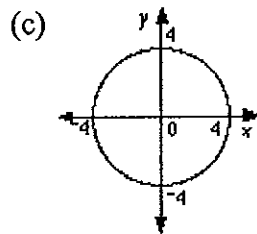
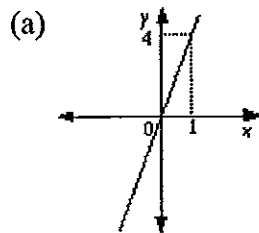
(b)  $3x + 4y = 12$

(c) (iii)

(d)  $xy = -C$

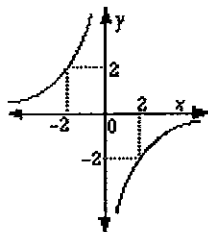
(e)  $x^2 + y^2 = 81$

2.



3. (a) 4, not defined, -4, -2

3. (b)

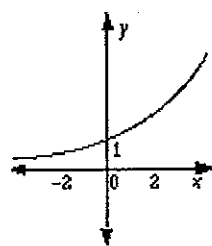


(c) Hyperbola

4. (a) 0.25, 0.5, 1, 2, 4, 8



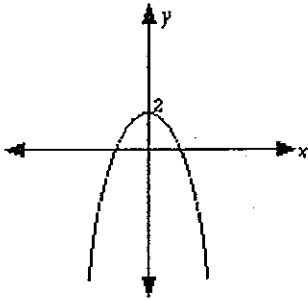

(b)

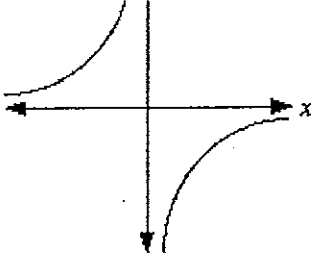


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