ALGEBRA — Answers

1 $ax^2 + bx + c = 0$

$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$

$(x + \frac{b}{2a})^2 - \frac{b^2}{4a^2} + \frac{c}{a} = 0$

$(x + \frac{b}{2a})^2 = \frac{b^2}{4a^2} - \frac{c}{a} = \frac{b^2 - 4ac}{4a^2}$

$x + \frac{b}{2a} = \pm\sqrt{\frac{b^2 - 4ac}{4a^2}} = \pm\frac{\sqrt{b^2 - 4ac}}{2a}$

$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2 **a** $x = \frac{-4 \pm \sqrt{16 - 4}}{2}$

$x = \frac{-4 \pm 2\sqrt{3}}{2}$

$x = -2 \pm \sqrt{3}$

b $t = \frac{-8 \pm \sqrt{64 + 16}}{-2}$

$t = \frac{-8 \pm 4\sqrt{5}}{-2}$

$t = 4 \pm 2\sqrt{5}$

c $y = \frac{20 \pm \sqrt{400 - 364}}{2}$

$y = \frac{20 \pm 6}{2}$

$y = 7$ or 13

d $r = \frac{-2 \pm \sqrt{4 + 28}}{2}$

$r = \frac{-2 \pm 4\sqrt{2}}{2}$

$r = -1 \pm 2\sqrt{2}$

e $a = \frac{-18 \pm \sqrt{324 - 24}}{2}$

$a = \frac{-18 \pm 10\sqrt{3}}{2}$

$a = -9 \pm 5\sqrt{3}$

f $m^2 - 5m - 5 = 0$

$m = \frac{5 \pm \sqrt{25 + 20}}{2}$

$m = \frac{1}{2}(5 \pm 3\sqrt{5})$

g $x = \frac{-11 \pm \sqrt{121 - 108}}{2}$

$x = \frac{1}{2}(-11 \pm \sqrt{13})$

h $u = \frac{-6 \pm \sqrt{36 - 24}}{4}$

$u = \frac{-6 \pm 2\sqrt{3}}{4}$

$u = \frac{1}{2}(-3 \pm \sqrt{3})$

i $y = \frac{1 \pm \sqrt{1 + 20}}{-2}$

$y = -\frac{1}{2}(1 \pm \sqrt{21})$

j $2x^2 - 3x - 2 = 0$

$x = \frac{3 \pm \sqrt{9 + 16}}{4}$

$x = \frac{3 \pm 5}{4}$

$x = -\frac{1}{2}$ or 2

k $p = \frac{-7 \pm \sqrt{49 - 12}}{6}$

$p = \frac{1}{6}(-7 \pm \sqrt{37})$

l $t^2 - 14t - 14 = 0$

$t = \frac{14 \pm \sqrt{196 + 56}}{2}$

$t = \frac{14 \pm 6\sqrt{7}}{2}$

$t = 7 \pm 3\sqrt{7}$

m $r^2 + 14r - 9 = 0$

$r = \frac{-14 \pm \sqrt{196 + 36}}{2}$

$r = \frac{-14 \pm 2\sqrt{58}}{2}$

$r = -7 \pm \sqrt{58}$

n $6u^2 + 4u - 1 = 0$

$u = \frac{-4 \pm \sqrt{16 + 24}}{12}$

$u = \frac{-4 \pm 2\sqrt{10}}{12}$

$u = \frac{1}{6}(-2 \pm \sqrt{10})$

o $3y^2 - 18y - 4 = 0$

$y = \frac{18 \pm \sqrt{324 + 48}}{6}$

$y = \frac{18 \pm 2\sqrt{93}}{6}$

$y = 3 \pm \frac{1}{3}\sqrt{93}$

p $4x^2 - 8x - 11 = 0$

$x = \frac{8 \pm \sqrt{64 + 176}}{8}$

$x = \frac{8 \pm 4\sqrt{15}}{8}$

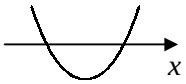
$x = 1 \pm \frac{1}{2}\sqrt{15}$

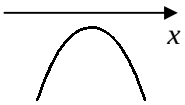
3 $2x^2 - 8x + 3 = 0$

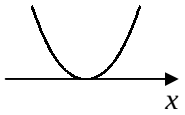
$x = \frac{8 \pm \sqrt{64 - 24}}{4} = \frac{8 \pm 2\sqrt{10}}{4} = 2 \pm \frac{1}{2}\sqrt{10}$

$\therefore$ $(2 - \frac{1}{2}\sqrt{10}, 0)$ and $(2 + \frac{1}{2}\sqrt{10}, 0)$

4 **a** $b^2 - 4ac > 0$ **b** $b^2 - 4ac = 0$ **c** $b^2 - 4ac < 0$

5 **a** 

b 

c 

d 

6 **a** $b^2 - 4ac = 32$
$\therefore$ real and distinct

b $b^2 - 4ac = -11$
$\therefore$ not real

c $b^2 - 4ac = -4$
$\therefore$ not real

d $b^2 - 4ac = 24$
$\therefore$ real and distinct

e $b^2 - 4ac = 0$
$\therefore$ real and equal

f $b^2 - 4ac = 13$
$\therefore$ real and distinct

g $b^2 - 4ac = 53$
$\therefore$ real and distinct

h $b^2 - 4ac = -7$
$\therefore$ not real

i $b^2 - 4ac = 4$
$\therefore$ real and distinct

j $b^2 - 4ac = -11$
$\therefore$ not real

k $b^2 - 4ac = 0$
$\therefore$ real and equal

l $b^2 - 4ac = -3$
$\therefore$ not real

m $b^2 - 4ac = -7$
$\therefore$ not real

n $b^2 - 4ac = \frac{13}{9}$
$\therefore$ real and distinct

o $b^2 - 4ac = \frac{1}{16}$
$\therefore$ real and distinct

p $b^2 - 4ac = -\frac{13}{75}$
$\therefore$ not real

7 equal roots
$\therefore\ b^2 - 4ac = 0$
$1 - 4p = 0$
$p = \frac{1}{4}$

8 repeated root
$\therefore\ b^2 - 4ac = 0$
$4q^2 + 4q = 0$
$4q(q + 1) = 0$
$q \neq 0\ \ \therefore\ \ q = -1$

9 $x^2 + rx - 2x + 4 = 0$ has equal roots
$\therefore\ b^2 - 4ac = 0$
$(r - 2)^2 - 16 = 0$
$r^2 - 4r - 12 = 0$
$(r + 2)(r - 6) = 0$
$r = -2$ or 6