National 5 Revision Booklet – Answers

1. Rounding

Rounding to decimal places

1.

(a) 4.8 (b) 6.2 (c) 9.8 (d) 10.6 (e) 21.4 (f) 3.1 (g) 48.2

(h) 29.3 (i) 80.9 (j) 0.4 (k) 248.4 (l) 637.5 (k) 62.9 (l) 10 (10.0)

2.

(a) 3.49 (b) 2.61 (c) 1.98 (d) 10.05 (e) 8.16

(f) 19.37 (g) 3.14 (h) 6.07 (i) 4.26 (j) 93.46

3.

(a) 0.035 (b) 6.757 (c) 4.225 (d) 1.758

(e) 40.485 (f) 128.019 (g) 0.506 (h) 384.456

Rounding to Significant Figures

Question 1:

(a) 40 (b) 20 (c) 80 (d) 70 (e) 100 (f) 100 (g) 500

(h) 300 (i) 700 (j) 900 (k) 400 (l) 700 (m) 100 (n) 1000

(o) 4000 (p) 5000 (q) 4000 (r) 3000 (s) 6000 (t) 8000 (u) 6000

Question 2:

(a) 10000 (b) 50000 (c) 70000 (d) 80000 (e) 100000 (f) 300000

(g) 900000 (h) 200000 (i) 500000 (j) 10000000

Question 3:

(a) 3 (b) 3 (c) 6 (d) 50 (e) 60 (f) 80 (g) 90

(h) 100 (i) 8 (j) 10 (k) 70 (l) 6000 (m) 50 (n) 100

Question 4:

(a) 0.5 (b) 0.9 (c) 0.2 (d) 0.05 (e) 0.09 (f) 0.007 (g) 0.004

(h) 0.06 (i) 0.9 (j) 0.0006 (k) 0.001 (l) 0.00003

Question 5:

(a) 840 (b) 670 (c) 130 (d) 2800 (e) 9300 (f) 1400 (g) 300

(h) 500 (i) 1000 (k) 3800 (k) 49000 (l) 14 (m) 58 (n) 50

(o) 1.4 (p) 43 (q) 0.32 (r) 22000 (s) 190000 (t) 0.049 (u) 5 (5.0)

(v) 1000000 (w) 3 (3.0) (x) 0.06 (0.0060)

Question 6:

(a) 9430 (b) 1890 (c) 2500 (d) 3.23 (e) 37800 (f) 57100 (g) 7.01

(h) 51.6 (i) 0.903 (j) 2.79 (k) 0.0891 (l) 0.00781 (m) 9910

(n) 0.601

2. Fractions

Improper/Mixed

Question 1:

(a) $2\frac{1}{3}$ (b) $1\frac{2}{5}$ (c) $2\frac{1}{2}$ (d) $1\frac{1}{7}$ (e) $1\frac{2}{3}$

(f) $3\frac{1}{3}$ (g) $11\frac{1}{2}$ (h) $2\frac{3}{4}$ (i) $1\frac{3}{8}$ (j) $2\frac{1}{4}$

(k) $1\frac{3}{10}$ (l) $2\frac{1}{6}$ (m) $2\frac{2}{7}$ (n) $5\frac{1}{10}$ (o) $3\frac{1}{11}$

Question 2:

(a) $\frac{11}{5}$ (b) $\frac{7}{2}$ (c) $\frac{7}{4}$ (d) $\frac{11}{3}$ (e) $\frac{7}{5}$

(f) $\frac{18}{7}$ (g) $\frac{4}{3}$ (h) $\frac{23}{10}$ (i) $\frac{19}{4}$ (j) $\frac{19}{12}$

(k) $\frac{39}{10}$ (l) $\frac{103}{50}$ (m) $\frac{29}{8}$ (n) $\frac{67}{8}$ (o) $\frac{23}{16}$

Adding and Subtracting Fractions

1.

(a) $\frac{9}{10}$ (b) $\frac{11}{14}$ (c) $\frac{5}{6}$ (d) $\frac{2}{15}$

(e) $\frac{5}{9}$ (f) $\frac{5}{6}$ (g) $\frac{7}{10}$ (h) $\frac{5}{8}$

2.

(a) $2\frac{1}{6}$ (b) $2\frac{1}{9}$ (c) $\frac{17}{20}$ (d) $\frac{3}{8}$

(e) $3\frac{5}{6}$ (f) $\frac{8}{9}$ (g) $3\frac{1}{18}$ (h) $3\frac{1}{24}$

(i) $5\frac{23}{30}$ (j) $1\frac{20}{63}$ (k) $2\frac{7}{60}$ (l) $7\frac{13}{15}$

Multiplying Fractions

1.

(a) $\frac{1}{10}$ (b) $\frac{3}{8}$ (c) $\frac{3}{20}$ (d) $\frac{1}{9}$

(e) $\frac{5}{12}$ (f) $\frac{3}{16}$ (g) $\frac{2}{21}$ (h) $\frac{5}{24}$

2.

(a) $\frac{5}{12}$ (b) $\frac{1}{2}$ (c) $1\frac{1}{8}$ (d) $1\frac{3}{4}$

(e) $\frac{5}{6}$ (f) $2\frac{1}{12}$ (g) $7\frac{2}{3}$ (h) $1\frac{5}{99}$

(i) $6\frac{7}{30}$ (j) $3\frac{2}{3}$ (k) $7\frac{13}{16}$ (l) $9\frac{1}{7}$

Dividing Fractions

1.

(a) $\frac{3}{10}$ (b) $\frac{15}{16}$ (c) $\frac{4}{7}$ (d) $\frac{4}{5}$

(e) $\frac{9}{40}$ (f) $\frac{36}{55}$ (g) $\frac{6}{13}$ (h) $\frac{27}{56}$

2.

(a) $\frac{10}{27}$ (b) $\frac{15}{19}$ (c) $4\frac{6}{7}$ (d) $\frac{14}{33}$

(e) $1\frac{7}{17}$ (f) $1\frac{43}{87}$ (g) $3\frac{5}{12}$ (h) $\frac{187}{288}$

3. Percentages

Compound Interest

Question 1: £4410

Question 2: 26620

Question 3: £9025

Question 4: £2105.74 or £2105.75

Question 5: 149.609 litres

Question 6: 419.4 cm or 4.194 m

Question 7: £100.40 or £100.41

Question 8: £124229.69

Question 9: 8698

Question 10: £4533.42

Question 11: 7 years

Question 12: 2039

Question 13: 12 years

Question 14: 25 years

Reverse Percentages

Question 1:
20

Question 2:
(a) 120
(b) 84

Question 3:
30

Question 4:
35g

Question 5:
320, 0000

Question 6:
£2000

Question 7:
£26

Question 8:
600

Question 9:
£50

Question 10:
40

Question 11:
£165

Question 12:
£440

Question 13:
£18,000

4. Surds

Simplifying

1. a) $2\sqrt{2}$ b) $5\sqrt{3}$ c) $2\sqrt{5}$ d) $4\sqrt{2}$ e) $4\sqrt{3}$ f) $10\sqrt{2}$
   g) $10\sqrt{3}$ h)$4\sqrt{5}$ i) $5\sqrt{2}$ j) $7\sqrt{2}$ k) $3\sqrt{7}$ l) $20\sqrt{2}$
   m) $6\sqrt{5}$ n) $2\sqrt{55}$ o) $4\sqrt{6}$ p) $5\sqrt{7}$ q) $10\sqrt{10}$ r) $2\sqrt{15}$
2. a) $10\sqrt{2}$ b) $4\sqrt{5}$ c) $20\sqrt{2}$ d) $21\sqrt{2}$ e) $60\sqrt{2}$ f) $50\sqrt{3}$

Adding and Subtracting

1. a) $5\sqrt{2}$ b) $7\sqrt{2}$ c) $8\sqrt{3}$ d) $6\sqrt{2}$ e) $9\sqrt{2}$ f) $6\sqrt{3}$
   g) $13\sqrt{10}$ h) $5\sqrt{7}$
2. a) $7\sqrt{2}$ b) $7\sqrt{3}$ c) $30\sqrt{2}$ d) $\sqrt{2}$ e) $25\sqrt{5}$ f) $7\sqrt{2}$
   g) $26\sqrt{3}$

Rationalising the denominator

1. a) $\frac{2\sqrt{3}}{3}$ b) $\frac{5\sqrt{2}}{2}$ c) $\frac{7\sqrt{6}}{6}$ d) $\frac{\sqrt{10}}{10}$ e) $2\sqrt{2}$ f) $\frac{3\sqrt{6}}{2}$
   g) $\frac{\sqrt{6}}{3}$ h) $\frac{3\sqrt{5}}{10}$

5. Indices

Laws of Indices

Question 1:

(a) 2^4 (b) 2^5 (c) 2^8 (d) 2^7 (e) 2^{14} (f) 2^3

(g) 2^5 (h) 2^{16} (i) 2^{11} (j) 2^9 (k) 2^{11} (l) 2^8

Question 2:

(a) 5^3 (b) 5^5 (c) 5^7 (d)5^2 (e) 5^2 (f) 5^7

(g) 5^3 (h) 5^6 (i) 5^{-4} (j) 5^{-2} (k) 5^{40} (l) 5^0

Question 3:

(a) 3^3 (b) 3^5 (c) 3^5 (d) 3^{15} (e) 3^0 (f) 3^{-2}

(g) 3^6 (h) 3^{-5}

Question 4:

(a) 8^{10} (b) 8^6 (c) 8^{12} (d) 8^{20} (e) 8^{18} (f) 8^{21}

(g) 8^{36} (h) 8^{18} (i) 8^{32} (j) 8^{-15} (k) 8^{-10}

Question 5:

(a) y^{10} (b) y^2 (c) y^4 (d) y^{15} (e) y^6 (f) y^{-4}

(g) y^{45} (h) y^{13} (i) y^{13} (j) y^{12} (k) y^3

Negative

Question 1: Evaluate each of the following

(a) 5^{-2} $\frac{1}{25}$ (b) 2^{-1} $\frac{1}{2}$ (c) 2^{-3} $\frac{1}{8}$ (d) 4^{-2} $\frac{1}{16}$ (e) 3^{-3} $\frac{1}{27}$ (f) 6^{-1} $\frac{1}{6}$

(g) 10^{-2} $\frac{1}{100}$ (h) 2^{-4} $\frac{1}{16}$ (i) 9^{-2} $\frac{1}{81}$ (j) 3^{-4} $\frac{1}{81}$ (k) 10^{-1} $\frac{1}{10}$ (l) 7^{-2} $\frac{1}{49}$

(m) 2^{-5} $\frac{1}{32}$ (n) 5^{-3} $\frac{1}{125}$ (o) 2^{-6} $\frac{1}{64}$ (p) 10^{-4} $\frac{1}{10000}$ (q) 6^{-3} $\frac{1}{216}$ (r) 10^{-6} $\frac{1}{1000000}$

Question 2: Write each of the following in index form.

(a) $\frac{1}{5^2}$ 5^{-2} (b) $\frac{1}{3^4}$ 3^{-4} (c) $\frac{1}{8^3}$ 8^{-3} (d) $\frac{1}{4^5}$ 4^{-5} (e) $\frac{1}{10^3}$ 10^{-3} (f) $\frac{1}{2^6}$ 2^{-6}

Fractional Indices

Question 1

(a) 5 (b) 9 (c)2 (d) 12 (e) 2 (f) 5 (g) 10 (h) 10 (i) 7 (j) 15 (k) 8 (l) 3

(m) 6 (n) 4 (o) 2 (p) 1 (q) 3 (r) 5

Question 2

(a) 27 (b) 8 (c) 4 (d) 9 (e) 25 (f) 343 (g) 32 (h) 16 (i) 243 (j) 1000

(k) 64 (l) 100 (m) 100,000 (n) 4 (o) 128 (p) 32 (q) 8 (r) 27 (s) 8

(t) 243 (u) 32 (v) 1000

6. Scientific Notation

Writing in scientific notation

1.

a) $4x10^{4}$ b) $2x10^{6}$ c) $8x10^{6}$ d) $7x10^{3}$

e) $1x10^{8}$ f) $9x10^{2}$ g) $2.5x10^{5}$ h) $1.9x10^{3}$

i) $5.4x10^{7}$ j) $1.1x10^{7}$ k) $8.9x10^{4}$ l) $3.6x10^{9}$

2.

a) $2x10^{-3}$ b) $5x10^{-4}$ c) $9x10^{-1}$ d) $4x10^{-8}$

e) $6.5x10^{-4}$ f) $2.2x10^{-3}$ g) $3.61x10^{-2}$ h) $5.58x10^{-4}$

i) $4.23x10^{-6}$ j) $9.81x10^{-8}$ k) $4.07x10^{-3}$ l) $2.052x10^{-2}$

Calculations

Question 1: $5.567x10^{6}$

Question 2: $3.67x10^{9}$

Question 3: $1.6x10^{-2}$

Question 4: 651,000

Question 5: $3.201x10^{4}$

Question 6: $20 \times 5x10^{4} = 1,000,000$

Question 7: $400 \times 100 \times 0.0036 = 144kg$

Question 8: a) $1.8x10^{10}$

b) $2.5x10^{-3}$

Question 9: 14,100,000

Question 10: 3,000,000,000 or $3x10^{9}$

7. Expanding Brackets

Single brackets

1.

(a) $5y + 15$ (b) $4a + 8$ (c) $8w + 80$ (d) $3x - 21$

(e) $9s - 9$ (f) $16 - 2t$ (g) $28 + 7h$ (h) $10a + 20b + 30c$

(i) $12y + 8$ (j) $10p - 5$ (k) $21a + 6$ (l) $18x - 45$

2.

(a) $-2w - 10$ (b) $-3c - 21$ (c) $-8c - 56$ (d) $-10y + 20$

(e) $-7g + 21$ (f) $-8w - 12$ (g) $-27w + 45$ (h) $-45x + 9$

(i) $-30 + 5c$ (j) $-24 - 18m$ (k) $-2 - 18c$ (l) $-40a + 35w$

3.

(a) $7y + 29$ (b) $21w + 48$ (c) $11y + 14$ (d) $9g + 11$

(e) $2x + 20$ (f) $-4y - 11$ (g) $55 + 7m$ (h) 26

(i) $18 + 15y$

Double brackets

1.

(a) $w^2 + 6w + 8$ (b) $y^2 + 3y + 2$ (c) $c^2 + 7c + 10$

(d) $x^2 + 13x + 42$ (e) $a^2 + 2a - 15$ (f) $g^2 + 3g - 28$

(g) $s^2 + s - 20$ (h) $x^2 - 2x - 3$ (i) $p^2 - 5p + 6$

(j) $y^2 - 8y + 16$ (k) $k^2 - 11k + 30$ (l) $v^2 + 7v + 12$

2.

(a) $4c^2 + 8c + 3$ (b) $10x^2 + 27x + 5$ (c) $3w^2 + 5w + 2$

(d) $6p^2 + p - 2$ (e) $5g^2 + g - 4$ (f) $8a^2 + 2a - 21$

(g) $8r^2 - 22r + 15$ (h) $18y^2 - 29y + 3$ (i) $10k^2 - 13k + 4$

Two/Three

1.

(a) $x^3 + x^2 - x$ **(b)** $6x^2 - 9x + 15$ **(c)** $3x^3 - 5x^2 + 8x$

(d) $2x^3 + 4x^2 + 6x$ **(e)** $-5x^2 + 40x - 10$ **(f)** $x^3 - 4x^2 - 7x$

2.

(a) $x^3 + 5x^2 + 7x + 2$ **(b)** $x^3 + 9x^2 + 22x + 10$

(c) $x^3 + 6x^2 + 9x + 4$ **(d)** $x^3 + 4x^2 + 8x + 15$

(e) $x^3 + 10x^2 + 19x + 24$ **(f)** $x^3 + 11x^2 + 34x + 24$

(g) $x^3 + 13x^2 + 19x + 84$ **(h)** $x^3 + 13x^2 + 39x + 90$

(i) $x^3 + 21x^2 + 115x + 63$

3.

(a) $x^3 - 1$ **(b)** $x^3 - 4x^2 - 16x - 35$

(c) $x^3 + 2x^2 - 5x - 6$ **(d)** $x^3 + 2x^2 - 23x - 4$

(e) $x^3 - 5x^2 + 11x - 15$ **(f)** $x^3 - 11x^2 + 32x - 12$

(g) $x^3 - 5x^2 + 6x - 8$ **(h)** $x^3 - 3x^2 + 9x - 7$

(i) $x^3 - 6x^2 - 29x + 18$

4.

(a) $2x^3 + 14x^2 + 29x + 45$ **(b)** $5x^3 - 14x^2 + 3x - 18$

(c) $6x^3 - 17x^2 + 17x - 14$ **(d)** $3x^3 + 30x^2 + 61x - 14$

(e) $5x^3 - 21x^2 - 4x + 32$ **(f)** $7x^3 + 5x^2 + 9x + 11$

(g) $6x^3 + 11x^2 + 6x + 1$ **(h)** $3x^3 - 29x^2 - 38x + 8$

(i) $10x^3 + 11x^2 - 41x + 14$

5.

(a) $x^2 + 7x - 8$ **(b)** $4x^2 - x - 3$ **(c)** $4x^2 + 8x + 5$

(d) $-x^2 - 4$ **(e)** $12x - 3$ **(f)** $-9x - 22$

(g) $2x^2 - 10x + 8$ **(h)** $5x^2 - x + 2$ **(i)** $21 + 8x - 4x^2$

(j) $3x^3 + 20x^2 + 21x$ **(k)** $2x^3 - x^2 - 2x + 9$ **(l)** $1 - 3x - x^2 - x^3$

8. Factorising

HCF

1.

(a) 2(2x + 3) (b) 5(3x + 4) (c) 3(3y – 4) (d) 5(x + 3)
(e) 3(2x – 1) (f) 4(x + 2) (g) 5(y – 5) (h) 8(w + 3)
(i) 5(2y + 3) (j) 7(2w + 3) (k) 10(2y – 3) (l) 9(3x + 2)

2.

(a) x(x + 7) (b) x(x – 3) (c) y(y + 1) (d) w(w + 9)
(e) x(x – 7) (f) 2w(2w + 5) (g) 2x(3x – 4) (h) 3y(3y – 2)
(i) c(10 + c) (j) g(5 – g) (k) 7x(2x + 5) (l) 10x(4x – 5)

DOTS

Question 1

(a) (x – 5)(x + 5)
(b) (y – 7)(y + 7)
(c) (w – 10)(w + 10)
(d) (x – 2)(x + 2)
(e) (c – 8)(c + 8)
(f) (x – 1)(x + 1)
(g) (x – 30)(x + 30)
(h) (y – 3)(y + 3)
(i) (4 – x)(4 + x)
(j) (1 – y)(1 + y)
(k) (9 – x)(9 + x)
(l) (12 – h)(12 + h)
(m) (x – y)(x + y)
(n) (a – c)(a + c)
(o) (3x – 5)(3x + 5)
(p) (2y – 1)(2y + 1)
(q) (7x – 4)(7x + 4)
(r) (10 – 9x)(10 + 9x)
(s) (3x – 2y)(3x + 2y)
(t) (6a – c)(6a + c)
(u) (11w – 14y)(11w + 14y)
(v) (15 – 11y)(15 + 11y)

Question 2

(a) $2(x - 4)(x + 4)$

(b) $2(y - 3)(y + 3)$

(c) $2(x - 10)(x + 10)$

(d) $3(x - 5)(x + 5)$

(e) $5(c - 2)(c + 2)$

(f) $2(3x - 1)(3x + 1)$

(g) $3(2x - 7)(2x + 7)$

(h) $20(y - 4)(y + 4)$

Trinomial

Question 1:

a)	(x+3)(x+4)	b)	(x+2)(x+4)	c)	(x+2)(x+3)	d)	(x+7)(x+1)
e)	(x+2)(x+2) *	f)	(x+5)(x+3)	g)	(x+3)(x+3)*	h)	(x+7)(x+4)
i)	(x+5)(x+5)*	j)	(x+2)(x+10)	k)	(x+24)(x+1)	l)	(x+8)(x+3)
m)	(x+2)(x+7)	n)	(x+20)(x+3)	o)	(x+25)(x+4)	p)	(x+17)(x+3)

Question 2:

a)	(x-3)(x+4)	b)	(x+6)(x-1)	c)	(x-2)(x+5)	d)	(x+4)(x-1)
e)	(x-6)(x+8)	f)	(x+8)(x-4)	g)	(x+7)(x-5)	h)	(x+11)(x-3)

Question 3

a)	(x+2)(x-5)	b)	(x+4)(x-5)	c)	(x-9)(x+3)	d)	(x-3)(x+1)
e)	(x-4)(x+3)	f)	(x+2)(x-6)	g)	(x-7)(x+3)	h)	(x-11)(x+5)

Question 4

a)	(x-3)(x-3)*	b)	(x-4)(x-5)	c)	(x-2)(x-7)	d)	(x-2)(x-11)
e)	(x-1)(x-8)	f)	(x-4)(x-8)	g)	(x-12)(x-3)	h)	(x-6)(x-8)

Question 5:

a)	(x-1)(x-8)	b)	(x+23)(x+1)	c)	(x+2)(x-7)	d)	(x-3)(x-4)
e)	(x+6)(x+6)	f)	(x+7)(x-9)	g)	(x+2)(x+12)	h)	(x + 12)(x + 5)
i)	(x-5)(x-6)	j)	(x-8)(x+4)	k)	(x-9)(x+7)	l)	(x-17)(x+1)
m)	(x-2)(x-9)	n)	(x-11)(x-2)	o)	(x+14)(x+4)	p)	(x-10)(x-11)
q)	(x-8)(x-8)	r)	(x+11)(x+11)*	s)	(x-9)(x+8)	t)	(x-6)(x+3)
u)	(x-9)(x+5)	v)	(x-7)(x-9)				

*Note: Any repeated factor can be written as a square

ie $(x+2)(x+2) = (x+2)^2$

Question 6

a)	(x+15)(x-7)	b)	(x-22)(x+4)	c)	(x-5)(x-70)	d)	(x+16)(x+6)*
e)	(x+11)(x+14)	f)	(x-60)(x+5)	g)	(x-20)(x-9)	h)	(x-15)(x+14)

Non-Unitary x^2 Trinomials

Question 1:

(a) $(2x+5)(x+1)$	(b) $(2x+5)(x+3)$	(c) $(2x+5)(x+2)$
(d) $(3x+1)(x+4)$	(e) $(3x+1)(x+1)$	(f) $(3x+2)(x+2)$
(g) $(5x+3)(x+2)$	(h) $(5x+1)(x+5)$	(i) $(7x+3)(x+1)$
(j) $(11x+3)(x+4)$	(k) $(2x+9)(x+4)$	(l) $(5x+2)(x+12)$

Question 2:

(a) $(3x+4)(x-1)$	(b) $(7x-1)(x+3)$	(c) $(2x-3)(x-5)$
(d) $(3x-2)(x-5)$	(e) $(3x+2)(x-6)$	(f) $(3x-4)(x+1)$
(g) $(5x+2)(x-3)$	(h) $(3x-1)(x+3)$	(i) $(2x-5)(x+2)$
(j) $(2x-11)(x+4)$	(k) $(7x-8)(x-2)$	(l) $(2x+19)(x-2)$

9. Quadratics

Completing the Square

Question 1

(a) $(x+4)^2-15$	(b) $(x+5)^2-22$	(c) $(x+1)^2-2$
(d) $(x-3)^2-19$	(e) $(x-2)^2-17$	(f) $(x-6)^2-33$
(g) $(x+7)^2-46$	(h) $(x-1)^2-16$	(i) $(x+2)^2-15$
(j) $(x+0.5)^2-8.25$	(k) $(x+1.5)^2-1.25$	(l) $(x-3.5)^2-14.25$
(m) $(x-4.5)^2-21.25$	(n) $(x+5.5)^2-27.25$	(o) $(x-50)^2-2525$

Solving by factorising

Question 1

(a) $x=1, x=3$	(b) $y=4, y=9$	(c) $m=-1, m=-6$
(d) $x=3, x=-2$	(e) $t=-7, t=3$	(f) $k=10, k=-9$
(g) $w=-5, w=-11$	(h) $y=8, y=2$	(i) $x=-3, x=9$

Question 2

(a) $x=-4, x=-2$	(b) $x=-4, x=-3$	(c) $y=-5, y=-2$
(d) $y=-4, y=1$	(e) $x=-2, x=4$	(f) $m=3, m=4$
(g) $y=5$	(h) $y=-5, y=9$	(i) $x=-7, x=8$
(j) $y=-6, y=-4$	(k) $x=-6, x=-3$	(l) $x=-22, x=-1$
(m) $y=2, y=11$	(n) $x=-4, x=3$	(o) $m=-3, m=9$
(p) $x=2, x=9$	(q) $y=6, y=8$	(r) $x=7, x=8$
(s) $m=-7, m=8$	(t) $y=-16, y=-6$	(u) $k=-4, k=22$

Quadratic Formula

Question 1:

(a) -0.2 and -4.8	(b) -0.3 and -3.2	(c) -0.5 and -1.5
(d) 1.2 and -3.2	(e) 0.8 and -2.1	(f) 1.3 and -3.8
(g) 0.6 and 3.4	(h) 0.2 and 0.6	(i) 0.5 and 2.9
(j) -2.9 and 3.9	(k) 8.4 and -2.4	(l) 2.4 and -1.9
(m) 1.1 and 0.2	(n) -0.5	(o) 1.7 and -0.7
(p) 6.4 and -7.9	(q) 9.9 and -2.3	(r) -0.1 and 7.9

Discriminant

1.	**(a)**	4	2 real and distinct	**(b)**	0	2 real and equal
	(c)	36	2 real and distinct	**(d)**	49	2 real and distinct
	(e)	9	2 real and distinct	**(f)**	0	2 real and equal
	(g)	1	2 real and distinct	**(h)**	−23	no real roots
	(i)	196	2 real and distinct	**(j)**	169	2 real and distinct
	(k)	28	2 real and distinct	**(l)**	−80	no real roots
	(m)	17	2 real and distinct	**(n)**	−55	no real roots
	(o)	16	2 real and distinct	**(p)**	0	2 real and equal
	(q)	−11	no real roots	**(r)**	0	2 real and equal

Quadratics Graphs

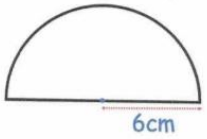
1.	**(a)**	$y = x^2$	**(b)**	$y = 3x^2$	**(c)**	$y = 5x^2$	**(d)**	$y = 1 \cdot 5x^2$
	(e)	$y = 5x^2$	**(f)**	$y = 3x^2$	**(g)**	$y = -x^2$	**(h)**	$y = -2x^2$
	(i)	$y = -5x^2$	**(j)**	$y = \frac{1}{2}x^2$	**(k)**	$y = \frac{1}{4}x^2$	**(l)**	$y = \frac{1}{3}x^2$

10. Arcs and Sectors

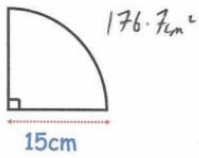
Sector Area

Question 1: Calculate the area of each of the following sectors.
Give each answer to one decimal place and include units.

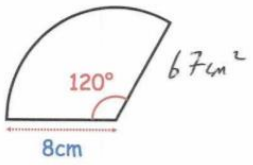
(a) 56.5cm^2



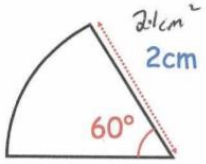
(b) 176.7cm^2



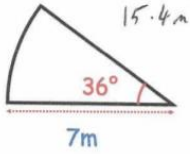
(c) 67cm^2



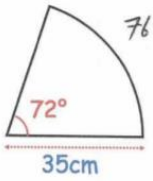
(d) 2.1cm^2



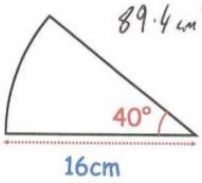
(e) 15.4m^2



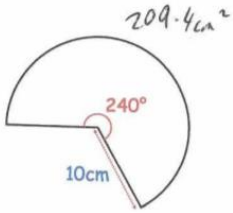
(f) 769.7cm^2



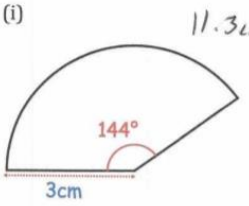
(g) 89.4cm^2



(h) 209.4cm^2



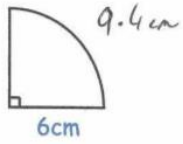
(i) 11.3cm^2



Arc Length

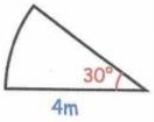
Question 1: For each sector below, calculate the length of the arc.
Give your answers to one decimal place and include suitable units.

(a) 9.4cm

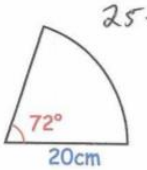


(b) 31.4cm

(c) 2.1m

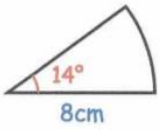


(d) 25.1cm

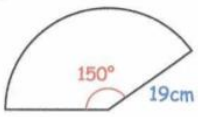


Question 2: For each sector below, calculate the length of the arc.
Give your answers to one decimal place and include suitable units.

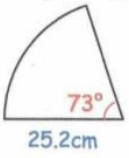
(a) 2cm



(b) 49.7cm



(c) 32.1cm



(d) 246.1cm

11. Algebraic Fractions

Simplifying

Question 1: Simplify the following algebraic fractions

(a) $\frac{42xyz}{56}$ $\frac{3xyz}{4}$

(b) $\frac{45ab}{60abc}$ $\frac{3}{4c}$

(c) $\frac{16mn}{18n}$ $\frac{8m}{9}$

(d) $\frac{40x^2y}{32xy}$ $\frac{5x}{4}$

(e) $\frac{17cf}{34c^3}$ $\frac{f}{2c^2}$

(f) $\frac{8x^4}{2x^2}$ $4x^2$

(g) $\frac{33a^2b^2}{44a^3b}$ $\frac{3b}{4a}$

(h) $\frac{12x^3}{20x^7}$ $\frac{3}{5x^4}$

Question 2: Simplify the following algebraic fractions

(a) $\frac{6x+8}{2}$ $3x+4$ (b) $\frac{9x-12}{3}$ $3x-4$ (c) $\frac{35x^2+20}{5}$ $7x^2+4$

(d) $\frac{7m-70n^3}{7}$ $m-10n^3$ (e) $\frac{10c+25}{15}$ $\frac{2c+5}{3}$ (f) $\frac{8w+2-4x}{12}$ $\frac{4w+1-2x}{6}$

(g) $\frac{9x^2+12x+33}{6}$ $\frac{3x^2+4x+11}{2}$ (h) $\frac{3x^2+5x}{x}$ $3x+5$ (i) $\frac{3x^3-7x^2}{x}$ $3x^2-7x$

Question 3: Simplify the following algebraic fractions

(a) $\frac{(x+6)(x+3)}{(x+3)}$ $x+6$ (b) $\frac{(x-1)(x+1)}{(x-1)}$ $x+1$ (c) $\frac{(x-3)}{(x-4)(x-3)}$ $\frac{1}{x-4}$

(d) $\frac{(x+7)^2}{(x+7)}$ $x+7$ (e) $\frac{(x-3)(x+2)}{(x+2)(x+9)}$ $\frac{x-3}{x+9}$ (f) $\frac{(x+2)(x+4)^2}{(x+4)}$ $(x+2)(x+4)$ or x^2+6x+8

(g) $\frac{(x+1)(x+2)(x+3)}{(x+2)(x+3)(x+4)}$ $\frac{x+1}{x+4}$ (h) $\frac{x(x+3)^2}{x(x+1)(x+3)}$ $\frac{x+3}{x+1}$

Question 4: Simplify the following algebraic fractions

(a) $\frac{x^2+5x+4}{x^2+4x+3}$ $\frac{x+4}{x+3}$ (b) $\frac{x^2+6x+9}{x^2-2x-15}$ $\frac{x+3}{x-5}$ (c) $\frac{x^2-2x}{x^2+2x-8}$ $\frac{x}{x+4}$

(d) $\frac{x^2-7x+10}{x^2+3x-10}$ $\frac{x-5}{x+5}$ (e) $\frac{x^2+8x+15}{x^2-x-12}$ $\frac{x+5}{x-4}$ (f) $\frac{x^2+13x+40}{x^2+14x+48}$ $\frac{x+5}{x+6}$

(g) $\frac{x^2-2x-8}{x^2+6x-40}$ $\frac{x+2}{x+10}$ (h) $\frac{x^2+10x+24}{x^2-36}$ $\frac{x+4}{x-6}$ (i) $\frac{x^2+4x-45}{x^2+10x+9}$ $\frac{x-5}{x+1}$

(j) $\frac{x^2+11x}{x^2-121}$ $\frac{x}{x-11}$ (k) $\frac{x^2-1}{x^2+x}$ $\frac{x-1}{x}$ (l) $\frac{x^2-15x+44}{x^2-16}$ $\frac{x-11}{x+4}$

Adding and Subtracting

Question 1

(a) $\frac{8x}{15}$ (b) $\frac{9c}{14}$ (c) $\frac{4w}{9}$

(d) $\frac{x}{6}$ (e) $\frac{4a}{45}$ (f) $\frac{3m}{8}$

Question 2

(a) $\frac{5x+11}{6}$ (b) $\frac{12x+11}{10}$ (c) $\frac{26x+13}{12}$

(d) $\frac{11x-7}{6}$ (e) $\frac{17x-10}{6}$ (f) $\frac{9x-16}{8}$

(g) $\frac{19x+10}{6}$ (h) $\frac{13x-8}{10}$ (i) $\frac{7x+36}{6}$

Question 3

(a) $\frac{5x+17}{(x+1)(x+5)}$ (b) $\frac{3x+7}{(x+1)(x+3)}$ (c) $\frac{2x-14}{(x-1)(x+5)}$

(d) $\frac{2x^2+7x-1}{(x-2)(x+5)}$ (e) $\frac{-x^2+5x-1}{2x^2-x-1}$ (f) $\frac{5x^2+20x+35}{(x+7)(3x+1)}$

Multiplying

Question 1:

(a) $\frac{6}{gh}$ (b) $\frac{3a}{4c}$ (c) $\frac{3w}{ax}$

(d) $\frac{6ac}{7g}$ (e) $\frac{af}{be}$ (f) $\frac{de}{64}$

Question 2

(a) $\frac{x}{2}$ (b) $\frac{5a}{2c}$ (c) $\frac{w}{2a}$

(d) $\frac{2ac}{21}$ (e) $2g$ (f) $\frac{3}{10}$

Dividing

Question 1:

(a) $\frac{3x}{4}$ (b) $\frac{5a}{cd}$ (c) $\frac{3a}{2w}$

(d) $\frac{c^2}{12}$ (e) $\frac{7a}{8c}$ (f) $\frac{14}{27y}$

(g) $\frac{2}{9}$ (h) $\frac{b^2}{6}$ (i) $8g$

Question 2:

(a) $\frac{1}{12}$ (b) $\frac{x+3}{x+1}$ (c) $\frac{3}{4}$

(d) 6 (e) $\frac{4x}{3}$ (f) $\frac{11}{6x}$

12. Straight Line

Gradient

(a) 3 (b) 4 (c) 4

(d) -1 (e) 2 (f) $-\frac{1}{4}$

Equation of a straight line

Question 1:

(a) 3 (b) 2 (c) 7 (d) 10

(e) 1 (f) 6 (g) -4 (h) -3

(i) $\frac{1}{2}$ (j) $-\frac{4}{5}$

Question 2:

(a) (0,3) (b) (0,1) (c) (0,-2) (d) (0,-5)

(e) (0,0) (f) (0,6) (g) (0,-3) (h) (0,0)

(i) $(0, \frac{2}{5})$ (j) $(0,-\frac{1}{2})$

Question 3:

(a) $y = 3x + 6$ (b) $y = 2x - 1$

(c) $y = -4x + 3$ (d) $y = 8x + 4$

(e) $y = x + 4$ (f) $y = 4x - 2$

(g) $y = -5x$

Question 4:

(a) $y = 2x + 5$ (b) $y = 7x + 3$ (c) $y = 2x - 1$

(d) $y = -\frac{1}{2}x + 8$ (e) $y = -5x$ (f) $y = 2x - 10$

Question 5:

(a) $y = 4x + 3$ (b) $y = 3x + 2$ (c) $y = 4x$

(d) $y = x - 9$ (e) $y = 2x - 6$ (f) $y = 3x + 14$

(g) $y = \frac{1}{2}x + 2$ (h) $y = 1.5x + 7$ (i) $y = 4.5x + 18$

Rearranging the equation

(a) gradient = -1	y-intercept = 10	(b) gradient = 1	y-intercept = 4
(c) gradient = -2	y-intercept = 6	(d) gradient = 3	y-intercept = 1
(e) gradient = -4	y-intercept = $-\frac{9}{2}$	(f) gradient = $\frac{5}{2}$	y-intercept = -2
(g) gradient = $-\frac{7}{2}$	y-intercept = $\frac{1}{2}$	(h) gradient = $\frac{6}{15}$	y-intercept = $\frac{8}{15}$
(i) gradient = $-\frac{1}{3}$	y-intercept = $\frac{5}{2}$	(j) gradient = $\frac{5}{2}$	y-intercept = 5
(k) gradient = $-\frac{4}{3}$	y-intercept = 2		

13. Solving Equations

Two Step Equations

(a) x = 3	(b) w = 5	(c) y = 4
(d) x = 3	(e) c = 10	(f) m = 3
(g) w = 11	(h) p = 4	(i) I = 8
(j) a = 6	(k) x = 12	(l) w = 0
(m) x = 4	(n) w = 13	(o) x = 12

Equations with letters on both sides

Question 1:

(a) x = 3	(b) x = 6	(c) x = 4	(d) x = 9
(e) x = 4	(f) x = 17	(g) x = 8	(h) x = 1
(i) x = 4	(j) x = 2	(k) x = 6	(l) x = 3
(m) x = 9	(n) x = 1	(o) x = 6	(p) x = 6
(q) x = 11	(r) x = 5		

Question 2

(a) x = 6	(b) x = 5	(c) x = 7	(d) x = 9.5
(e) x = 11	(f) x = −6	(g) x = −3	(h) x = 19

Equations with fractions

Question 1:

(a) x=12	(b) w=3
(c) a=40	(d) w=56
(e) x=230	(f) c=45
(g) t=210	(h) y=4.5
(i) x=6.4	(j) x=20
(k) x=-12	(l) x=-72

Question 2:

(a) x=32	(b) x=28
(c) w=5	(d) x=72
(e) m=12	(f) x=-30
(g) k=-44	(h) x=-36

Question 3

(a) x=5	(b) w=10
(c) x=44	(d) x=23
(e) w=4	(f) x=-6
(g) w=-36	(h) x=1

Question 4

(a) x=3 (b) x=9

(c) x=7 (d) x=1.3

(e) x=5.6 (f) x=7.5

(g) x=-5 (h) x=-8

(i) x=-9 (j) x=7

(k) x=2 (l) x=-12

Question 5

(a) x=11 (b) x=7

(c) x=-1 (d) x=9

(e) x=-3 (f) x=-1

(g) x=-3 (h) x=-4.5

(i) x=-9

Solving Inequalities

(a) $x > 4$ (b) $9.5 \geq x$ (c) $x < 2.5$ (d) $x \geq 4$

14. Changing the subject

Question 1:

(a) $y = c - w$ (b) $y = m + p$ (c) $y = s - m$

(d) $y = n + 2g$ (e) $y = \frac{c}{3}$ (f) $y = \frac{w}{a}$

(g) $y = cw$ (h) $y = 2ac$ (i) $y = a - p$

(j) $y = c + k$ (k) $y = \sqrt{s}$ (l) $y = \sqrt[3]{x}$

(m) $y = g^2$ (n) $y = \frac{c}{\pi}$ (o) $y = n - t$

(p) $y = \frac{c}{r}$ (q) $y = \frac{b}{4\pi}$ (r) $y = c + r - 7t$

(s) $y = \frac{r}{w}$ (t) $y = \sqrt{k + x}$ (u) $y = \frac{A}{x}$

Question 2:

(a) $x = \frac{w-c}{4}$ (b) $x = \frac{8+t}{d}$ (c) $x = \sqrt{h-3}$

(d) $x = \frac{P-2y}{2}$ (e) $x = \sqrt{s+3}$ (f) $x = \frac{y-s}{z}$

(g) x = n(w – 2) (h) x = 6(w + 5) (i) x = ch – 3

(j) $x = \frac{3y-1}{4}$ (k) $x = \sqrt{v-a}$ (l) $x = \sqrt[3]{5y+4}$

(m) x = 2cm – t (n) x = 3uz – w (o) $x = \sqrt{\frac{A}{\pi}}$

(p) $x = \frac{2A}{b}$ (q) $x = \frac{V}{ab}$ (r) $x = \frac{v^2-u^2}{2a}$

(s) $x = \frac{a+b}{r}$ (t) $x = \frac{ab}{5c}$ (u) $x = kw^3$

Question 3:

(a) $c = \sqrt{t} - a$

(b) $c = \frac{v-u}{a}$

(c) $c = \sqrt{\frac{v}{\pi h}}$

15. Simultaneous Equations

Question 1:

(a) x=2
y=6

(b) x=1
y=3

(c) x=3
y=2

(d) x=15
y=6

(e) x=5
y=6

(f) x=3
y=0.5

(g) x=4
y=1

(h) x=23
y=5

(i) x=2.5
y=11

Question 2:

(a) x=5
y=4

(b) x=5
y=2

(c) x=4
y=9

(d) x=11
y=10

(e) x=7.5
y=3.5

(f) x=7
y=1

(g) x=10
y=20

(h) x=7
y=3

(i) x=19
y=5

Question 3:

(a) x=5
y=2

(b) x= -4
y= 3

(c) x=2
y=4

(d) x=8
y=2

(e) x=-1
y=5

(f) x=-4
y=2

(g) x=5
y=2

(h) x=2.5
y=1

(i) x=11
y=10

Worded Simultaneous Equations

Question 1: Coffee is £2.50 Tea is £1.50

Question 2: Rosemary is 77 Hannah is 25

Question 3: Adult ticket is £9.50 Child ticket is £3.50

Question 4: £765

Question 5: £80

Question 6: 120 rulers and 80 pens

Question 7: £4.20