Armadale Academy
National 5 Mathematics

Assessment 2
Revision Booklet

Contents:

Rounding to Significant Figures

1. Round the following to 1 significant figure:

(a) 2.9   (b) 3.2   (c) 5.7   (d) 46.81   (e) 57.25   (f) 80.96   (g) 94.9

2. Round the following to 2 significant figures:

(a) 844   (b) 665   (c) 129   (d) 2840   (e) 9250   (f) 1359   (g) 298

3. Round the following to 3 significant figures:

(a) 9433   (b) 1891   (c) 2496   (d) 3.226   (e) 37756   (f) 57147   (g) 7.0078

Rounding to
Significant Figures

Percentages (Compound Interest, Appreciation, Depreciation)

1. Paul leaves £4000 in the bank for two years.
   It earns compound interest of 5% per year.
   Calculate the total amount Paul has in the bank at the end of the two years.

2. The population of birds on an island is estimated to increase by 10% every year.
   The population of birds on the island is 20000.
   Calculate an estimate for the population of birds in three years time.

3. A full water tank holds 500 litres.
   The tank begins to leak water and is losing 14% of its contents every hour.
   Find how much water is left in the tank after 8 hours.

4. The height of a tree increases by 60% each year.
   When planted the tree was 40cm tall.
   How tall will the tree be in 5 years time.

5. A house was bought for £100,000
   Its value appreciates by 7.5% each year for the first three years.
   What was its value at the end of the three years?

6. The number of people living on a remote island decreases by 9% every 10 years.
   In 1950 there were 18000 living on the island.
   Calculate how many less people will be living on the island in 2020.

Percentages (Compound
Interest etc.)

Reverse Percentages

Question 1: 20% of all the children in a class are left handed.
4 children are left handed.
How many children are there in the class altogether?

Question 2: 30% of the members of a tennis club are pensioners.
36 members are pensioners.

(a) How many members are there in total?
(b) How many members are not pensioners?

Question 3: A group of people sit their driving theory test and 24 people passed.
80% of the people passed the driving theory test.
How many people sat the test altogether?

Question 4: An energy bar contains 2.1g of protein.
6% of the bar is protein.
What is the total mass of the bar?

Question 5: Swansea is a city in Wales.
The population of Swansea is 240,000
This population is 7.5% of the total population of Wales.
What is the total population of Wales?

Question 6: Heather invested money into a savers bank account.
Each year the money in the account earns 10% interest.
After one year, the total amount of money in the account was £2200
How much did Heather invest?

Question 7: A chair is on sale at a price of £20.80
This is a 20% reduction of the normal price.
What was the price of the chair before the reduction?

Question 8: The population of an island has decreased by 40% over 50 years.
The population in 2018 was 360
What was the population in 1968?

Fractions

1. Simplify fully:

(a) $\dfrac{14}{35}$ (b) $\dfrac{8}{64}$ (c) $\dfrac{18}{24}$ (d) $\dfrac{75}{100}$ (e) $\dfrac{24}{80}$ (f) $\dfrac{6}{42}$

(g) $\dfrac{36}{66}$ (h) $\dfrac{18}{45}$ (i) $\dfrac{70}{120}$ (j) $\dfrac{49}{56}$ (k) $\dfrac{22}{110}$ (l) $\dfrac{18}{72}$

(m) $\dfrac{60}{140}$ (n) $\dfrac{45}{135}$ (o) $\dfrac{40}{360}$ (p) $\dfrac{64}{100}$ (q) $\dfrac{85}{35}$ (r) $\dfrac{48}{36}$

Reverse Percentages

Simplifying Fractions

2. Calculate the following, simplify your answers where possible:

(a) $1\frac{1}{2} + \frac{2}{3}$ (b) $\frac{7}{9} + 1\frac{1}{3}$ (c) $1\frac{3}{5} - \frac{3}{4}$ (d) $1\frac{5}{8} - 1\frac{1}{4}$

(e) $2\frac{1}{2} + 1\frac{1}{3}$ (f) $2\frac{2}{9} - 1\frac{1}{3}$ (g) $2\frac{2}{9} + \frac{5}{6}$ (h) $1\frac{5}{12} + 1\frac{5}{8}$

(i) $3\frac{1}{10} + 2\frac{2}{3}$ (j) $1\frac{8}{9} - \frac{4}{7}$ (k) $3\frac{2}{3} - 1\frac{11}{20}$ (l) $4\frac{8}{15} + 3\frac{1}{3}$

Adding and Subtracting Fractions

3. Calculate the following, simplify your answers where possible:

(a) $1\frac{2}{3} \times \frac{1}{4}$ (b) $\frac{2}{5} \times 1\frac{1}{4}$ (c) $\frac{3}{4} \times 1\frac{1}{2}$ (d) $2\frac{1}{2} \times \frac{7}{10}$

(e) $\frac{1}{4} \times 3\frac{1}{3}$ (f) $1\frac{2}{3} \times 1\frac{1}{4}$ (g) $4\frac{3}{5} \times 1\frac{2}{3}$ (h) $1\frac{2}{11} \times \frac{8}{9}$

Multiplying Fractions

4. Calculate the following, simplify your answers where possible:

(a) $\frac{2}{3} \div 1\frac{4}{5}$ (b) $1\frac{1}{2} \div 1\frac{9}{10}$ (c) $2\frac{3}{7} \div \frac{1}{2}$ (d) $2\frac{1}{3} \div 5\frac{1}{2}$

(e) $3 \div 2\frac{1}{8}$ (f) $4\frac{1}{3} \div 2\frac{9}{10}$ (g) $6\frac{5}{6} \div 2$ (h) $1\frac{5}{12} \div 2\frac{2}{11}$

Dividing Fractions

Median and Interquartile Range

Find the median and IQR:

1. 2, 4, 5, 7, 9, 10, 12

2. 13, 14, 14, 15, 15, 18, 21

3. 11, 18, 12, 15, 12, 23, 25, 21, 20

4. 1, 7, 2, 11, 9, 3, 1, 6, 10, 7, 8

5. 53, 52, 34, 25, 57, 44, 58, 37, 54

6. 51, 48, 50, 54, 37, 33

Median and IQR

APPLYING QUESTION

The time taken, in minutes, for members of a new running club to complete a 5km run is shown:

| 34 | 42 | 28 | 45 | 36 | 40 |
| 48 | 23 | 30 | 39 | 38 | 26 |

(a)   Calculate the median and the interquartile range.

After 6 months training the median time was 29 minutes and the interquartile range was 17.

(b)   Make **two** valid statements to compare the performance before and after training.

Mean and Standard Deviation

Calculate the mean and standard deviation of each:

1. 14, 17, 15, 23, 20, 19

2. 8, 13, 7, 6, 8, 9, 5

3. 1.8, 3.7, 4, 2.6, 5.9

4. 102, 108, 112, 109, 110, 107

5. 47, 56, 61, 52, 59

6. 1, 2, 4, 1, 3, 2, 1

Formulae

$$s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$$

Or

$$= \sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}}$$

Mean and Standard Deviation

APPLYING QUESTION

The prices, in pence, at five petrol stations around Airdrie for a litre of unleaded are:

121   119   120   117   118

(a) Calculate the mean and standard deviation.

(b) Why do you think the standard deviation must be so low?

(c) If each petrol station had to put their price up by 4 pence what effect would it have on the mean and standard deviation?

Algebra – Expanding Brackets

A) Expand and Simplify:

1. $3(x-3) + 2(x-5)$

2. $-7(2t - 3w) - 11(t-1)$

3. $(x+4)(x+6)$

4. $(x-8)(x-7)$

5. $(3x+4)(2x-1)$

6. $(5x-3)(x-2)$

Expanding Brackets

B) Expand and simplify:

1. $(x+3)(x^2 + 2x + 1)$

2. $(x+2)(3x^2 + 5x - 1)$

3. $(2x+1)(x^2 - 3x + 4)$

4. $(x-2)(x^2 + 5x + 2)$

5. $(x-5)(x^2 - 3x - 10)$

6. $(2x+3)(x^2 - 4x + 3)$

Volume

Formulae   Volume of a sphere $V = \frac{4}{3}\pi r^3$ Volume of a cone $V = \frac{1}{3}\pi r^2 h$
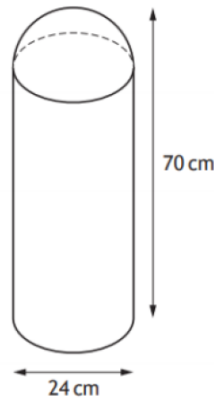
           Volume of a pyramid $V = \frac{1}{3}Ah$

1.

A traffic bollard is in the shape of a cylinder with a hemisphere on top.

The bollard has

- diameter 24 centimetres
- height 70 centimetres.

70 cm

24 cm

Calculate the volume of the bollard.

Give your answer correct to 3 significant figures.

Volume of Cylinder

Volume of Cone

2.   A toy company makes juggling balls in the shape of a sphere with a diameter of 6·4 centimetres.

6·4 cm
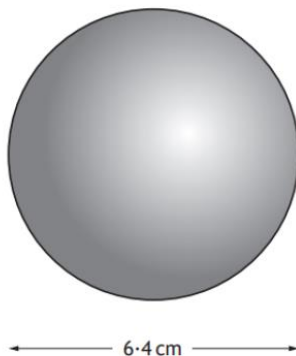
Calculate the volume of one juggling ball.

Give your answer correct to 2 significant figures.

Volume of Pyramid

Volume of Sphere

3.   A spherical sweet is made by coating a caramel sphere evenly with chocolate.

A cross-section of the sweet is shown below.

3 mm

24 mm
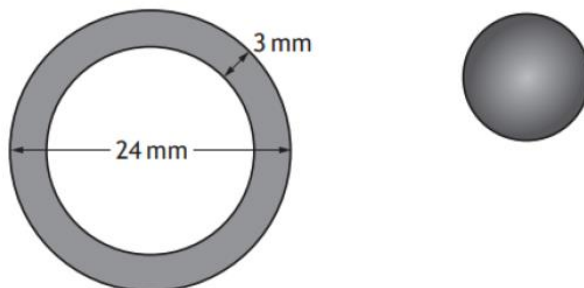
The diameter of the sweet is 24 millimetres and the thickness of the chocolate coating is 3 millimetres.

Calculate the volume of the chocolate coating.

Give your answer correct to 3 significant figures.

Composite Volume

6

4. A child's toy is in the shape of a hemisphere with a cone on top, as shown in the diagram.

The toy is 10 centimetres wide and 16 centimetres high.

Calculate the volume of the toy.

Give your answer correct to 2 significant figures.

16 cm

10 cm
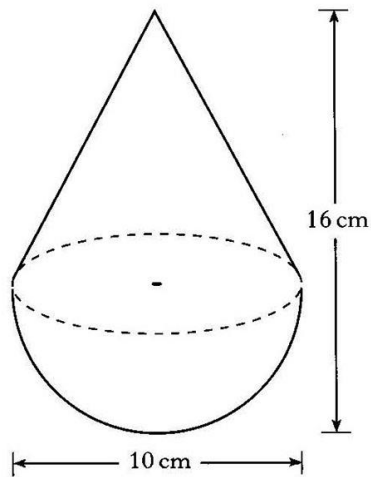
5. A square based pyramid is shown in the diagram below.

6 cm
6 cm
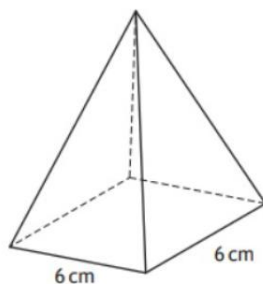
The square base has length 6 centimetres.
The volume is 138 cubic centimetres.
Calculate the height of the pyramid.

Factorising

HCF

Question 1: Factorise the following expressions

(a) $4x + 6$ (b) $15x + 20$ (c) $9y - 12$ (d) $5x + 15$

(e) $6x - 3$ (f) $4x + 8$ (g) $5y - 25$ (h) $8w + 24$

Question 2: Factorise the following expressions

(a) $x^2 + 7x$ (b) $x^2 - 3x$ (c) $y^2 + y$ (d) $w^2 + 9w$

(e) $x^2 - 7x$ (f) $4w^2 + 10w$ (g) $6x^2 - 8x$ (h) $9y^2 - 6y$

DOTS

Question 1: Factorise each of the following

(a) $x^2 - 25$ (b) $y^2 - 49$ (c) $w^2 - 100$ (d) $x^2 - 4$

(e) $c^2 - 64$ (f) $x^2 - 1$ (g) $x^2 - 900$ (h) $y^2 - 9$

(i) $16 - x^2$ (j) $1 - y^2$ (k) $81 - x^2$ (l) $144 - h^2$

(m) $x^2 - y^2$ (n) $a^2 - c^2$ (o) $9x^2 - 25$ (p) $4y^2 - 1$

Question 2:   Factorise **fully** each of the following

(a) $2x^2 - 32$ (b) $2y^2 - 18$ (c) $2x^2 - 200$ (d) $3x^2 - 75$

(e) $5c^2 - 20$ (f) $18x^2 - 2$ (g) $12x^2 - 147$ (h) $20y^2 - 320$

Trinomials (unitary x^2)

Question 1:   Factorise each of the following

(a) $x^2 + 7x + 12$ (b) $x^2 + 6x + 8$ (c) $x^2 + 5x + 6$ (d) $x^2 + 8x + 7$

(e) $x^2 + 4x + 4$ (f) $x^2 + 8x + 15$ (g) $x^2 + 6x + 9$ (h) $x^2 + 11x + 28$

Question 2:   Factorise each of the following

(a) $x^2 + x - 12$ (b) $x^2 + 5x - 6$ (c) $x^2 + 3x - 10$ (d) $x^2 + 3x - 4$

(e) $x^2 + 2x - 48$ (f) $x^2 + 4x - 32$ (g) $x^2 + 2x - 35$ (h) $x^2 + 8x - 33$

Question 3:   Factorise each of the following

(a) $x^2 - 3x - 10$ (b) $x^2 - x - 20$ (c) $x^2 - 6x - 27$ (d) $x^2 - 2x - 3$

(e) $x^2 - x - 12$ (f) $x^2 - 4x - 12$ (g) $x^2 - 4x - 21$ (h) $x^2 - 6x - 55$

Trinomials

Trinomials (non-unitary x^2)

Question 1:   Factorise each of the following

(a) $2x^2 + 7x + 5$ (b) $2x^2 + 11x + 15$ (c) $2x^2 + 9x + 10$

(d) $3x^2 + 13x + 4$ (e) $3x^2 + 4x + 1$ (f) $3x^2 + 8x + 4$

Question 2:   Factorise each of the following

(a) $3x^2 + x - 4$ (b) $7x^2 + 20x - 3$ (c) $2x^2 - 13x + 15$

(d) $3x^2 - 17x + 10$ (e) $3x^2 - 16x - 12$ (f) $3x^2 - x - 4$

Harder Trinomials

Surds

1. Simplify the following:

(a) $\sqrt{8}$ (b) $\sqrt{75}$ (c) $\sqrt{20}$ (d) $\sqrt{32}$ (e) $\sqrt{48}$ (f) $\sqrt{200}$

(g) $\sqrt{300}$ (h) $\sqrt{80}$ (i) $\sqrt{50}$ (j) $\sqrt{98}$ (k) $\sqrt{63}$ (l) $\sqrt{800}$

(m) $\sqrt{180}$ (n) $\sqrt{220}$ (o) $\sqrt{96}$ (p) $\sqrt{175}$ (q) $\sqrt{1000}$ (r) $\sqrt{60}$

Intro and simplifying

2. Simplify the following:

(a) $5\sqrt{8}$ (b) $2\sqrt{20}$ (c) $4\sqrt{50}$ (d) $3\sqrt{98}$ (e) $15\sqrt{32}$ (f) $10\sqrt{75}$

3. Simplify the following:

(a) $\sqrt{8} + \sqrt{18}$ (b) $\sqrt{50} + \sqrt{8}$ (c) $\sqrt{75} + \sqrt{27}$ (d) $\sqrt{200} - \sqrt{32}$

(e) $\sqrt{8} + \sqrt{2} + \sqrt{72}$ (f) $\sqrt{300} - \sqrt{48}$ (g) $\sqrt{1000} + \sqrt{90}$ (h) $\sqrt{28} + \sqrt{63}$

Adding and Subtracting

4. Simplify:

(a) $3\sqrt{8} + \sqrt{2}$ (b) $4\sqrt{27} - \sqrt{75}$ (c) $2\sqrt{50} + 5\sqrt{32}$ (d) $\sqrt{200} - 3\sqrt{18}$

(e) $4\sqrt{80} + 3\sqrt{45}$ (f) $6\sqrt{75} - 2\sqrt{12}$ (g) $10\sqrt{7} + 2\sqrt{175}$

5. Simplify:

(a) $\sqrt{2}(\sqrt{3} + 5)$ (b) $\sqrt{3}(\sqrt{5} + \sqrt{2})$ (c) $\sqrt{6}(2 - \sqrt{3})$ (d) $\sqrt{10}(5 + \sqrt{10})$

(e) $\sqrt{2}(\sqrt{18} - \sqrt{2})$ (f) $\sqrt{5}(3\sqrt{2} - \sqrt{5})$ (g) $2\sqrt{3}(3\sqrt{2} + \sqrt{3})$ (h) $4\sqrt{11}(5\sqrt{2} + 2\sqrt{11})$

(i) $\sqrt{27}(\sqrt{2} + \sqrt{3})$ (j) $\sqrt{12}(7 - \sqrt{3})$

Expanding Brackets with Surds

6. Express the following with a rational denominator:

(a) $\dfrac{2}{\sqrt{3}}$ (b) $\dfrac{5}{\sqrt{2}}$ (c) $\dfrac{7}{\sqrt{6}}$ (d) $\dfrac{1}{\sqrt{10}}$

(e) $\dfrac{4}{\sqrt{2}}$ (f) $\dfrac{9}{\sqrt{6}}$ (g) $\dfrac{\sqrt{2}}{\sqrt{3}}$ (h) $\dfrac{3}{2\sqrt{5}}$

(i) $\dfrac{\sqrt{5}}{\sqrt{80}}$ (j) $\dfrac{5\sqrt{5}}{\sqrt{20}}$

Rationalising the denominator

Indices

Q1 Fully simplify, expressing your answer with a positive power:

a) $\dfrac{x^2 \times x^5}{x^3}$ b) $\dfrac{x \times x^5}{x^8}$ c) $\dfrac{x^3 \times x^{-5}}{x^4}$

d) $\dfrac{3x^{-3} \times 4x^7}{2x^3}$ e) $\dfrac{6x^2}{3x^{-2} \times 3x^6}$ f) $\dfrac{x^{-3} \times 2x^4}{4x^5 \times x^{-1}}$

Laws of Indices

Q2 Fully simplify, expressing your answer with no brackets or negative powers:

a) $(xy)^3$ b) $(4x^2y)^3$ c) $\left(\frac{2}{3}x^2y^4\right)^3$

d) $(x^4)^2 \times x^3$ e) $(x^{-4})^2 \times x^{-2}$ f) $x^{-6} \times (x^3)^2$

g) $(2x^3)^2 \times (3x^{-4})^2$ h) $(x^3 \times x^{-5})^{-3}$ i) $(x^{-4} \div x^{-1})^2$

Negative Indices

Q3 Express each of these expressions in the form x^n.

a) $\sqrt{x}$ b) $\sqrt[3]{x}$ c) $\left(\sqrt[3]{x}\right)^5$

d) $\dfrac{1}{\sqrt{x}}$ e) $\dfrac{1}{\sqrt[3]{x}}$ f) $\left(\dfrac{1}{\sqrt[3]{x}}\right)^2$

Q4 Evaluate:

a) $9^{\frac{1}{2}}$

b) $9^{-\frac{1}{2}}$

c) $8^{\frac{1}{3}}$

d) $8^{-\frac{1}{3}}$

e) $16^{\frac{3}{2}}$

f) $27^{-\frac{4}{3}}$

g) $16^{\frac{3}{4}}$

h) $64^{-\frac{2}{3}}$

i) $100^{-\frac{3}{2}}$

j) $\left(\frac{1}{4}\right)^{\frac{3}{2}}$

k) $\left(\frac{25}{9}\right)^{-\frac{1}{2}}$

l) $\left(\frac{27}{64}\right)^{-\frac{2}{3}}$

Q5 Expand and simplify:

a) $x^2(x^2 + 3)$

b) $x^2(x^{-4} + x^{-2})$

c) $2x^2\left(\frac{1}{x} + \frac{1}{2}x^{-2}\right)$

d) $x^{\frac{1}{2}}\left(x^{\frac{1}{2}} - 5x^{-\frac{1}{2}}\right)$

e) $2x^{-\frac{1}{2}}\left(x^{\frac{3}{2}} - 3x^{-\frac{1}{2}}\right)$

f) $3x^{-\frac{1}{4}}\left(x^{\frac{9}{4}} + 2x^{\frac{1}{2}}\right)$

Answers

Rounding

1. (a) 3　(b) 3　(c) 6　(d) 50　(e) 60　(f) 80　(g) 90　　**2.** (a) 840　(b) 670　(c) 130　(d) 2800　(e) 9300　(f) 1400　(g) 300

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

Percentages (Comp Int, App, Dep)

1. £4410　　**2.** 26620　　**3.** 149.609 Litres　　**4.** 419.4cm or 4.194m　　**5.** £124229.69　　**6.** 8698

Reverse Percentages

1. 20　　**2. a)** 120, **b)** 84　　**3.** 30　　**4.** 35g　　**5.** 3 200 000　　**6.** £2000　　**7.** £26　　**8.** 600

Fractions

1. a) $\frac{2}{5}$　b) $\frac{1}{8}$　c) $\frac{3}{4}$　d) $\frac{3}{4}$　e) $\frac{3}{10}$　f) $\frac{1}{7}$　g) $\frac{6}{11}$　h) $\frac{2}{5}$　i) $\frac{7}{12}$

j) $\frac{7}{8}$　k) $\frac{1}{5}$　l) $\frac{1}{4}$　m) $\frac{3}{7}$　n) $\frac{1}{3}$　o) $\frac{1}{9}$　p) $\frac{16}{25}$　q) $\frac{17}{7}$　r) $\frac{4}{3}$

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) $7\frac{13}{15}$

3. (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) $9\frac{1}{7}$

4. (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) $\frac{187}{288}$

Median and IQR

1. Median = 7, IQR = 6　　2. Median = 15, IQR = 4　　3. Median = 18, IQR = 10　　4. Median = 7, IQR = 7　　5. Median = 52, IQR = 20

6. Median = 49, IQR = 14　　Applying Question. (a) Q_2 =37 , Q_1=29 & Q_3=41 IQR = 12
(b) median lower, more spread of times

Mean and SD

1. Mean = 18, SD = 3.35　　2. Mean = 8, SD = 2.58　　3. Mean = 3.6, SD = 1.56　　4. Mean 108, SD = 3.4　　5. Mean = 55, SD = 5.6

6. Mean = 18, SD = 3.35　　Applying Question = $\bar{x} = 119, s = 1{\cdot}58$ (b) Competition (c) Mean up by 4, Standard deviation the same.

Algebra

A) 1. $5x - 19$　　2. $21w - 25t + 11$　　3. $x^2 + 10x + 24$　　4. $x^2 - 15x + 56$　　5. $6x^2 + 5x - 4$　　6. $5x^2 - 13x + 6$

B) 1. $x^3 + 5x^2 + 7x + 3$　　2. $3x^3 + 11x^2 + 9x - 2$　　3. $2x^3 - 5x^2 + 5x + 4$　　4. $x^3 + 3x^2 - 8x - 4$　　5. $x^3 - 8x^2 + 5x + 50$
6. $2x^3 - 5x^2 - 6x + 9$　　7. $6x^3 + 10x^2 - 7x + 1$　　8. $x^3 - 8x^2 + 13x - 6$

Volume

1. $V = 29\,900\ cm^3$　　2. $140\ cm^3$　　3. $4180\ mm^3$　　4. $550\ cm^3$　　5. $11.5cm$

Factorising

HCF - Question 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) $8(w + 3)$

Question 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) $3y(3y - 2)$

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)

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)

Trinomials (unitary) –

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)

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)

Trinomials (non-unitary)

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) $(3x + 2)(x + 2)$

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) $(3x - 4)(x + 1)$

Surds

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) $50\sqrt{3}$

3. 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) $5\sqrt{7}$

4. a) $7\sqrt{2}$ b) $7\sqrt{3}$ c) $30\sqrt{2}$ d) $\sqrt{2}$

e) $25\sqrt{5}$ f) $26\sqrt{3}$ g) $20\sqrt{7}$

5. a) $\sqrt{6}+5\sqrt{2}$ b) $\sqrt{15}+\sqrt{6}$ c) $2\sqrt{6}-3\sqrt{2}$ d) $5\sqrt{10}+10$

e) 4 f) $3\sqrt{10}-5$ g) $6\sqrt{6}+6$ h) $20\sqrt{22}+88$

i) $3\sqrt{6}+9$ j) $14\sqrt{3}-6$

6. a) $\dfrac{2\sqrt{3}}{3}$ b) $\dfrac{5\sqrt{2}}{2}$ c) $\dfrac{7\sqrt{6}}{6}$ d) $\dfrac{\sqrt{10}}{10}$

e) $2\sqrt{2}$ f) $\dfrac{3\sqrt{6}}{2}$ g) $\dfrac{\sqrt{6}}{3}$ h) $\dfrac{3\sqrt{5}}{10}$

i) $\dfrac{1}{4}$ j) $\dfrac{5}{2}$

Indices

Q1 a) x^4 b) $\dfrac{1}{x^2}$ c) $\dfrac{1}{x^6}$

d) $6x$ e) $\dfrac{2}{3x^2}$ f) $\dfrac{1}{2x^3}$

Q2 a) x^3y^3 b) $64x^6y^3$ c) $\dfrac{8}{27}x^6y^{12}$

d) x^{11} e) $\dfrac{1}{x^{10}}$ f) 1

g) $\dfrac{36}{x^2}$ h) x^6 i) $\dfrac{1}{x^6}$

Q3 a) $x^{\frac{1}{2}}$ b) $x^{\frac{1}{3}}$ c) $x^{\frac{5}{3}}$

d) $x^{-\frac{1}{2}}$ e) $x^{-\frac{1}{3}}$ f) $x^{-\frac{2}{3}}$

Q4 a) 3 b) $\dfrac{1}{3}$ c) 2

d) $\dfrac{1}{2}$ e) 64 f) $\dfrac{1}{81}$

g) 8 h) $\dfrac{1}{16}$ i) $\dfrac{1}{1000}$

j) $\dfrac{1}{8}$ k) $\dfrac{3}{5}$ l) $\dfrac{16}{9}$

Q5 a) x^4+3x^2 b) $x^{-2}+1$ c) $2x+1$

d) $x-5$ e) $2x-6x^{-1}$ f) $3x^2+6x^{\frac{1}{4}}$