

| | | |
|--------------------|--|------------|
| NUMBER | N40a Decimals Between 0 and 1 - Multiplying | 119A |
| | N40b Decimals Between 0 and 1 - Dividing | 119B |
| | N41 Further Fractions - Adding and Subtracting | 120 |
| | N42a Further Fractions - Multiplying | 121 |
| | N42b Further Fractions - Dividing | 121 |
| | N43a Estimating Answers - Multiplication | 122A |
| | N43b Estimating Answers - Division | 122B |
| | N44 Using a Calculator | 123 |
| | N45a Standard Form - Numbers Above 1 | 124A |
| | N45b Standard Form - Numbers Between 0 and 1 | 124B |
| | N46 Exact Representation of Roots | 125 |
| ALGEBRA | A25 Trial and Improvement - Harder Questions | 126A, 126B |
| | A26a Further Simultaneous Equations - Introduction | 127 |
| | A26b Further Simultaneous Equations - Solving | 127 |
| | A26c Further Simultaneous Equations - Real-Life Contexts | 127 |
| | A27a Regions - Basics | 128 |
| | A27b Regions - Advanced | 128 |
| | A28 Exponential and Reciprocal Graphs | 129 |
| RATIO | R11a Compound Measures - Speed | 130 |
| | R11b Compound Measures - Density | 130 |
| | R12 Original-Value Problems | 131 |
| | R13 Inverse Proportion | 132 |
| GEOMETRY | G31 Congruent Triangles | 133 |
| | G32 Cones | 134 |
| | G33 Spheres | 135 |
| | G34 Enlargement - Negative Scale Factor | 136 |
| | G35a Trigonometry - Finding a Side | 137A |
| | G35b Trigonometry - Finding an Angle | 137B |
| PROBABILITY | P7 Relative Frequency | 138 |
| STATISTICS | S10a Averages from Tables - Mode, Median, Mean | 139A |
| | S10b Averages from Tables - Estimate for the Mean | 139B |

N40a

Decimals Between 0 and 1 Multiplying Answers

1) Work out the answers to the following:

- a) 24×0.2 4.8
- b) 13×0.4 5.2
- c) 60×0.7 42
- d) 243×0.2 48.6
- e) 0.6×700 420

2) Work out the answers to the following:

- a) 314×0.02 6.28
- b) 836×0.001 0.836
- c) 800×0.006 4.8
- d) 418×0.003 1.254
- e) 411×0.09 36.99

3) Work out the answers to the following:

- a) 0.2×0.4 0.08
- b) 0.1×0.03 0.003
- c) 0.02×0.06 0.0012
- d) 0.08×0.003 0.00024
- e) 0.05×0.08 0.004

4) Work out the answers to the following:

- a) 62×0.14 8.68
- b) 2.7×2.5 6.75
- c) 613×0.042 25.746
- d) 42.3×1.8 76.14
- e) 228×0.063 14.364

N40b

Decimals Between 0 and 1 Dividing Answers

1) Work out the answers to the following:

- a) $6 \div 0.2$ 30
- b) $8 \div 0.1$ 80
- c) $9 \div 0.3$ 30
- d) $4 \div 0.02$ 200
- e) $7 \div 0.002$ 3500

2) Work out the answers to the following:

- a) $62 \div 0.2$ 310
- b) $51 \div 0.3$ 170
- c) $4.56 \div 0.04$ 114
- d) $22.5 \div 0.05$ 450
- e) $14.7 \div 0.007$ 2100

3) Work out the answers to the following:

- a) $7.24 \div 0.2$ 36.2
- b) $8.13 \div 0.3$ 27.1
- c) $1.512 \div 0.07$ 21.6
- d) $0.16 \div 0.008$ 20
- e) $0.0732 \div 0.04$ 1.83

4) Work out the answers to the following:

- a) $0.718 \div 0.2$ 3.59
- b) $0.0141 \div 0.003$ 4.7
- c) $0.24 \div 0.012$ 20
- d) $1.625 \div 0.0013$ 1250
- e) $47.1 \div 0.15$ 314

N41

Further Fractions Adding and Subtracting Answers

1) Work out

a) $\frac{1}{3} + \frac{1}{2}$ $\frac{5}{6}$

b) $\frac{3}{5} + \frac{1}{4}$ $\frac{17}{20}$

c) $\frac{2}{7} + \frac{3}{5}$ $\frac{31}{35}$

d) $\frac{1}{2} + \frac{2}{9}$ $\frac{13}{18}$

e) $\frac{3}{10} + \frac{3}{7}$ $\frac{51}{70}$

3) Work out

a) $1\frac{2}{3} + \frac{3}{4}$ $2\frac{5}{12}$

b) $2\frac{1}{2} + \frac{5}{7}$ $3\frac{3}{14}$

c) $\frac{2}{5} + 3\frac{1}{2}$ $3\frac{9}{10}$

d) $1\frac{7}{10} + \frac{1}{5}$ $1\frac{9}{10}$

e) $2\frac{3}{4} + \frac{5}{6}$ $3\frac{7}{12}$

5) Work out

a) $\frac{2}{3} - \frac{1}{2}$ $\frac{1}{6}$

b) $\frac{3}{4} - \frac{2}{3}$ $\frac{1}{12}$

c) $\frac{4}{5} - \frac{3}{4}$ $\frac{1}{20}$

d) $\frac{5}{6} - \frac{2}{3}$ $\frac{1}{6}$

e) $\frac{3}{4} - \frac{3}{8}$ $\frac{3}{8}$

7) Work out

a) $4\frac{1}{2} - 2\frac{1}{2}$ 2

b) $1\frac{2}{5} - 1\frac{1}{10}$ $\frac{3}{10}$

c) $3\frac{2}{3} - 1\frac{11}{15}$ $1\frac{14}{15}$

d) $2\frac{3}{4} - 1\frac{5}{8}$ $1\frac{1}{8}$

e) $5\frac{2}{3} - 1\frac{4}{9}$ $4\frac{2}{9}$

2) Work out

a) $\frac{2}{3} + \frac{1}{6}$ $\frac{5}{6}$

b) $\frac{3}{5} + \frac{3}{10}$ $\frac{9}{10}$

c) $\frac{1}{2} + \frac{4}{5}$ $1\frac{3}{10}$

d) $\frac{5}{6} + \frac{3}{5}$ $1\frac{13}{30}$

e) $\frac{7}{12} + \frac{3}{4}$ $1\frac{1}{3}$

4) Work out

a) $2\frac{1}{2} + 1\frac{1}{5}$ $3\frac{7}{10}$

b) $1\frac{3}{4} + 1\frac{2}{3}$ $3\frac{5}{12}$

c) $3\frac{1}{6} + 1\frac{1}{3}$ $4\frac{1}{2}$

d) $2\frac{2}{9} + 1\frac{2}{3}$ $3\frac{8}{9}$

e) $4\frac{1}{2} + 2\frac{3}{10}$ $6\frac{4}{5}$

6) Work out

a) $1\frac{3}{4} - \frac{1}{2}$ $1\frac{1}{4}$

b) $2\frac{4}{5} - \frac{3}{4}$ $2\frac{1}{20}$

c) $3\frac{1}{6} - \frac{2}{3}$ $2\frac{1}{2}$

d) $2\frac{2}{9} - \frac{5}{6}$ $1\frac{7}{18}$

e) $6\frac{1}{2} - \frac{7}{8}$ $5\frac{5}{8}$

8) Work out

a) $3\frac{4}{5} + 1\frac{1}{2}$ $5\frac{3}{10}$

b) $4\frac{2}{9} - \frac{5}{6}$ $3\frac{7}{18}$

c) $2\frac{3}{8} + 1\frac{5}{6}$ $4\frac{5}{24}$

d) $2 - 1\frac{5}{8}$ $\frac{3}{8}$

e) $5 - 2\frac{1}{7}$ $2\frac{6}{7}$

9) Find the perimeter of the rectangle below.
Give your answer as a mixed number.

$12\frac{1}{6}$ cm

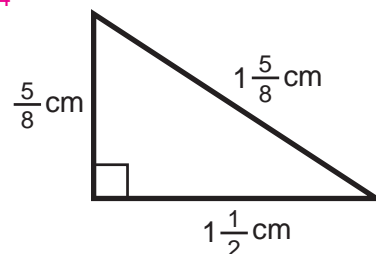
$3\frac{1}{3}$ cm

$2\frac{3}{4}$ cm



10) Find the perimeter of the triangle below.
Give your answer as a mixed number.

$3\frac{3}{4}$ cm



11) If a length of copper tubing is $20\frac{1}{4}$ cm long and Jim cuts off a piece that is $17\frac{3}{5}$ cm long, what is the length of the copper tubing left over? $2\frac{13}{20}$ cm

Further Fractions

N42a/b Multiplying and Dividing Answers

1) Work out

a) $\frac{1}{2} \times \frac{3}{4}$ $\frac{3}{8}$

b) $\frac{2}{3} \times \frac{4}{5}$ $\frac{8}{15}$

c) $\frac{10}{11} \times \frac{2}{3}$ $\frac{20}{33}$

d) $\frac{4}{9} \times \frac{2}{5}$ $\frac{8}{45}$

e) $\frac{4}{7} \times \frac{1}{9}$ $\frac{4}{63}$

3) Work out

a) $1\frac{1}{2} \times \frac{8}{9}$ $1\frac{1}{3}$

b) $2\frac{2}{3} \times \frac{6}{7}$ $2\frac{2}{7}$

c) $\frac{6}{11} \times 1\frac{1}{8}$ $\frac{27}{44}$

d) $4\frac{2}{5} \times \frac{10}{11}$ 4

e) $3\frac{3}{4} \times \frac{8}{9}$ $3\frac{1}{3}$

5) Work out

a) $\frac{2}{3} \div \frac{1}{2}$ $1\frac{1}{3}$

b) $\frac{3}{4} \div \frac{2}{3}$ $1\frac{1}{8}$

c) $\frac{2}{5} \div \frac{3}{4}$ $\frac{8}{15}$

d) $\frac{3}{7} \div \frac{6}{11}$ $\frac{11}{14}$

e) $\frac{3}{4} \div \frac{3}{8}$ 2

7) Work out

a) $2\frac{1}{2} \div 3\frac{1}{2}$ $\frac{5}{7}$

b) $3\frac{2}{5} \div 1\frac{1}{10}$ $3\frac{1}{11}$

c) $4\frac{1}{3} \div 1\frac{11}{15}$ $2\frac{1}{2}$

d) $2\frac{3}{4} \div 1\frac{5}{8}$ $1\frac{9}{13}$

e) $5\frac{2}{3} \div 1\frac{4}{9}$ $3\frac{12}{13}$

2) Work out

a) $\frac{2}{3} \times \frac{3}{5}$ $\frac{2}{5}$

b) $\frac{3}{7} \times \frac{5}{6}$ $\frac{5}{14}$

c) $\frac{8}{9} \times \frac{6}{10}$ $\frac{8}{15}$

d) $\frac{1}{2} \times \frac{8}{9}$ $\frac{4}{9}$

e) $\frac{7}{10} \times \frac{5}{21}$ $\frac{1}{6}$

4) Work out

a) $2\frac{1}{2} \times 2\frac{1}{5}$ $5\frac{1}{2}$

b) $3\frac{3}{4} \times 2\frac{2}{3}$ 10

c) $4\frac{1}{6} \times 2\frac{2}{5}$ 10

d) $2\frac{2}{9} \times 1\frac{1}{5}$ $2\frac{2}{3}$

e) $3\frac{4}{7} \times 1\frac{13}{15}$ $6\frac{2}{3}$

6) Work out

a) $\frac{3}{4} \div 1\frac{1}{5}$ $\frac{5}{8}$

b) $\frac{4}{7} \div 1\frac{7}{9}$ $\frac{9}{28}$

c) $2\frac{1}{4} \div \frac{6}{7}$ $2\frac{5}{8}$

d) $2\frac{3}{5} \div \frac{9}{10}$ $2\frac{8}{9}$

e) $1\frac{1}{2} \div \frac{3}{8}$ 4

8) Work out

a) $\frac{2}{3} \div 2$ $\frac{1}{3}$

b) $1\frac{3}{4} \div 14$ $\frac{1}{8}$

c) $4 \div \frac{2}{5}$ 10

d) $5 \div \frac{3}{4}$ $6\frac{2}{3}$

e) $3\frac{1}{2} \div 4$ $\frac{7}{8}$

9) Find the area of the rectangle below.
Give your answer as a mixed number.

$9\frac{1}{6} \text{ cm}^2$

$3\frac{1}{3} \text{ cm}$

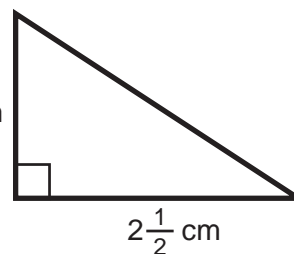
$2\frac{3}{4} \text{ cm}$



10) Find the area of the triangle below.
Give your answer as a mixed number.

$1\frac{7}{8} \text{ cm}^2$

$1\frac{1}{2} \text{ cm}$



$2\frac{1}{2} \text{ cm}$

11) Jim has a length of copper tubing which is 85 cm long.
He wants to cut it into pieces which are $4\frac{1}{4}$ cm long.
If there is no wastage, how many pieces will Jim get? **20**

N43a

Estimating Answers Multiplication Answers

1) Estimate the value of:

- a) 21×34 600
- b) 42×56 2400
- c) 17×62 1200
- d) 29×78 2400
- e) 66×96 7000

2) Estimate the value of:

- a) 510×724 350000
- b) 86×2146 180000
- c) 753×184 160000
- d) 48×6315 300000
- e) 3642×1356 4000000

N43b

Estimating Answers Division Answers

1) Estimate the value of:

a) $\frac{61}{19}$ 3

b) $\frac{76}{43}$ 2

c) $\frac{362}{78}$ 5

d) $\frac{738}{96}$ 7

e) $\frac{416}{781}$ 0.5

2) Estimate the value of:

a) $\frac{357}{12 \times 23}$ 2

b) $\frac{924}{34 \times 13}$ 3

c) $\frac{172 \times 411}{430}$ 200

d) $\frac{625 \times 43}{16 \times 38}$ 30

e) $\frac{972 \times 368}{17 \times 23 \times 18}$ 50

3) Estimate the value of:

a) $8 \div 0.12$ 80

b) $6 \div 0.24$ 30

c) $5 \div 0.49$ 10

d) $7 \div 0.012$ 700

e) $23 \div 0.18$ 115

4) Estimate the value of:

a) $\frac{24 \times 510}{0.53}$ 20000

b) $\frac{46 \times 6.2}{0.135}$ 3000

c) $\frac{215 \times 38}{0.183}$ 40000

d) $\frac{18.3 \times 31.2}{0.017}$ 30000

e) $\frac{405 \times 274}{0.488}$ 240000

N44 Using a Calculator

Answers

1) Using a calculator, work out the value of:

- a) $24 + 16 \div 4$ **28**
- b) $3 + 8 \div 2 \times 3$ **15**
- c) $60 \times 2 - 20 \div 4$ **115**
- d) $(2 + 7 \times 8) \times 4$ **232**
- e) $(3 + 7) \times (8 - 2)$ **60**

2) Using a calculator, work out the value of:

- a) $6^3 - (2^4 + 3^5)$ **-43**
- b) $(3^7 - 2^6) \div 10^4$ **0.2123**
- c) $2^8 \div 2^3 \times 5^2$ **800**
- d) $5^3 \times 3^5$ **30375**
- e) $2^{20} - 3^8$ **1042015**

3) Using a calculator, work out the value of:

- a) $\sqrt{256} \times 2^4 - \sqrt{169}$ **243**
- b) $\sqrt{365} \times \sqrt{365}$ **365**
- c) $\sqrt{550 - 21}$ **23**
- d) $\sqrt{2^8 + 3^4 - 13}$ **18**
- e) $\sqrt{4^6 \times 2^8} \div (3^2 - 1)$ **128**

4) Using a calculator, work out the value of:

- a) $\frac{7 + 4 \times 8}{18 - 5}$ **3**
- b) $\frac{6^3 - 2^3}{(3^2 + 7) \div 2}$ **26**
- c) $\frac{\sqrt{729} + 21}{\sqrt{64}}$ **6**
- d) $\frac{62 \times 2^4 + 2^3}{\sqrt{4^3 + 3^2 + 3^3}}$ **100**
- e) $\frac{284 - \sqrt{2^9 - 112}}{(3 + 17) \times \sqrt{100}}$ **1.32**

N45a

Standard Form Numbers Above 1 Answers

- 1) Write these numbers in standard form:
 - a) 40 000 4×10^4
 - b) 200 000 2×10^5
 - c) 600 6×10^2
 - d) 9 000 000 9×10^6
- 2) Write these numbers as digits and then in standard form:
 - a) twenty thousand 20 000 2×10^4
 - b) eighty million 80 000 000 8×10^7
 - c) three hundred thousand 300 000 3×10^5
- 3) Write these as normal numbers:
 - a) 7×10^5 700 000
 - b) 6×10^9 6 000 000 000
 - c) 3×10^{12} 3 000 000 000 000
 - d) 2×10^{14} 200 000 000 000 000
- 4) Write these as normal numbers:
 - a) 2.4×10^5 240 000
 - b) 3.26×10^9 3 260 000 000
 - c) 4.01×10^{12} 4 010 000 000 000
 - d) 7.115×10^{13} 71 150 000 000 000
- 5) Write these numbers in standard form:
 - a) 45 000 4.5×10^4
 - b) 607 000 000 6.07×10^8
 - c) 8 300 000 000 8.3×10^9
 - d) 910 200 9.102×10^5

Standard Form Numbers Between 0 and 1 Answers

N45b

1) Write these as normal numbers:

- a) 6×10^{-4} 0.000 6
- b) 7×10^{-8} 0.000 000 07
- c) 3×10^{-6} 0.000 003
- d) 9×10^{-11} 0.000 000 000 09

2) Write these as normal numbers:

- a) 2.6×10^{-3} 0.002 6
- b) 3.4×10^{-6} 0.000 003 4
- c) 5.23×10^{-5} 0.000 052 3
- d) 9.806×10^{-9} 0.000 000 009 806

3) Write these numbers in standard form:

- a) 0.000 06 6×10^{-5}
- b) 0.000 007 7×10^{-6}
- c) 0.000 000 03 3×10^{-8}
- d) 0.000 000 000 004 4×10^{-12}

4) Write these numbers in standard form:

- a) 0.000 63 6.3×10^{-4}
- b) 0.006 024 6.024×10^{-3}
- c) 0.000 007 4 7.4×10^{-6}
- d) 0.000 000 000 99 9.9×10^{-10}

N46

Exact Representation of Roots Answers



- 1) Give two consecutive integers that the answers to these questions lie between.

eg $\sqrt{7}$ is between 2 and 3

a) $\sqrt{15}$ is between 3 and 4

b) $\sqrt{23}$ is between 4 and 5

c) $\sqrt{79}$ is between 8 and 9



- 2) Which of these can be rewritten as an exact answer without the square root symbol? Where possible, write the answer.

a) $\sqrt{5}$

b) $\sqrt{25}$ 5

c) $\sqrt{10}$

d) $\sqrt{18}$

e) $\sqrt{100}$ 10



- 3) Find the decimal approximations for these, giving your answer to 1 decimal place:

a) $\sqrt{8}$ 2.8

b) $\sqrt{21}$ 4.6

c) $\sqrt{13}$ 3.6

d) $\sqrt{46}$ 6.8

e) $\sqrt{65}$ 8.1

f) $\sqrt{99}$ 9.9

- 1) The equation $x^2 + 3x = 37$
has a solution between 4 and 5.
Use a trial and improvement method to find this solution.
Give your answer to one decimal place.
You must show ALL your working.

| | | |
|------------|------------------------------------|------|
| $x = 4$ | $4^2 + 3 \times 4 = 28$ | Low |
| $x = 5$ | $5^2 + 3 \times 5 = 40$ | High |
| $x = 4.9$ | $4.9^2 + 3 \times 4.9 = 38.71$ | High |
| $x = 4.8$ | $4.8^2 + 3 \times 4.8 = 37.44$ | High |
| $x = 4.7$ | $4.7^2 + 3 \times 4.7 = 36.19$ | Low |
| $x = 4.75$ | $4.75^2 + 3 \times 4.75 = 36.8125$ | Low |

Therefore, $x = 4.8$ to one decimal place.

- 2) The equation $x^2 - 4x = 6$
has a solution between 5 and 6.
Use a trial and improvement method to find this solution.
Give your answer to one decimal place.
You must show ALL your working.

| | | |
|------------|-----------------------------------|------|
| $x = 5$ | $5^2 - 4 \times 5 = 5$ | Low |
| $x = 6$ | $6^2 - 4 \times 6 = 12$ | High |
| $x = 5.1$ | $5.1^2 - 4 \times 5.1 = 5.61$ | Low |
| $x = 5.2$ | $5.2^2 - 4 \times 5.2 = 6.24$ | High |
| $x = 5.15$ | $5.15^2 - 4 \times 5.15 = 5.9225$ | Low |

Therefore, $x = 5.2$ to one decimal place.

- 1) The equation $x^3 + 3x = 114$
has a solution between 4 and 5.
Use a trial and improvement method to find this solution.
Give your answer to one decimal place.
You must show ALL your working.

| | | |
|------------|---------------------------------------|------|
| $x = 4$ | $4^3 + 3 \times 4 = 76$ | Low |
| $x = 5$ | $5^3 + 3 \times 5 = 140$ | High |
| $x = 4.6$ | $4.6^3 + 3 \times 4.6 = 111.136$ | Low |
| $x = 4.7$ | $4.7^3 + 3 \times 4.7 = 117.923$ | High |
| $x = 4.65$ | $4.65^3 + 3 \times 4.65 = 114.494625$ | High |

Therefore, $x = 4.6$ to one decimal place.

- 2) The equation $x^3 - 2x = 9$
has a solution between 2 and 3.
Use a trial and improvement method to find this solution.
Give your answer to one decimal place.
You must show ALL your working.

| | | |
|------------|-------------------------------------|------|
| $x = 2$ | $2^3 - 2 \times 2 = 4$ | Low |
| $x = 3$ | $3^3 - 2 \times 3 = 21$ | High |
| $x = 2.1$ | $2.1^3 - 2 \times 2.1 = 5.061$ | Low |
| $x = 2.2$ | $2.2^3 - 2 \times 2.2 = 6.248$ | Low |
| $x = 2.3$ | $2.3^3 - 2 \times 2.3 = 7.567$ | Low |
| $x = 2.4$ | $2.4^3 - 2 \times 2.4 = 9.024$ | High |
| $x = 2.35$ | $2.35^3 - 2 \times 2.35 = 8.277875$ | Low |

Therefore, $x = 2.4$ to one decimal place.

A26a/b/c

Further Simultaneous Equations Answers

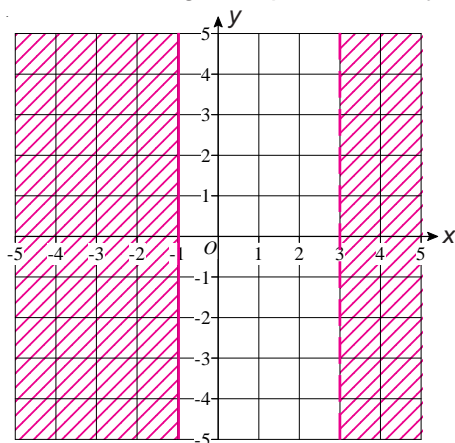
- 1) Solve $3x + y = 11$
 $x = 2, y = 5$ $4x - y = 3$
- 2) Solve $2x - 5y = 3$
 $x = 4, y = 1$ $4x + 5y = 21$
- 3) Solve $x - 2y = 3$
 $x = 2, y = -0.5$ $3x + 2y = 5$
- 4) Solve $x + 3y = 10$
 $x = 4, y = 2$ $x + y = 6$
- 5) Solve $3x + 2y = 3$
 $x = -2, y = 4.5$ $2x + 2y = 5$
- 6) Solve $5x - 3y = 23$
 $x = 4, y = -1$ $2x - 3y = 11$
- 7) Solve $3x - 2y = 6$
 $x = 4, y = 3$ $x + y = 7$
- 8) Solve $6x + y = 10$
 $x = 2, y = -2$ $2x - 3y = 10$
- 9) Solve $2x + 7y = 11$
 $x = 2, y = 1$ $3x - 2y = 4$
- 10) Solve $4x + 3y = 9$
 $x = 3, y = -1$ $5x + 2y = 13$
- 11) Solve $2x + 3y = -7$
 $x = -2, y = -1$ $7x - 2y = -12$
- 12) Solve $3x - 2y = 5$
 $x = \frac{1}{3}, y = -2$ $9x + 5y = -7$

- 13) In the first week of opening, a zoo sold 200 adult tickets and 300 child tickets. The takings for that week were £2600.
In the second week, 500 adult tickets were sold and 400 child tickets were sold. The takings for the second week were £5100.
Form two equations and solve them to find the price of an adult ticket and the price of a child ticket. **Adult ticket is £7**
Child ticket is £4
- 14) If you multiply Sid's age by four and Tony's age by five and add the answers together it comes to 259 years.
However, if you multiply Sid's age by seven and then take away two times Tony's age the answer is 120 years.
Form two equations and solve them to find the ages of Sid and Tony. **Sid is 26**
Tony is 31
- 15) If nine rats and seven ferrets cost £116.75 and four rats and six ferrets cost £88, how much would five rats and four ferrets cost? **£66.25**
- 16) If a mouse and a goldfish cost £1.10 and the mouse costs £1 more than the goldfish, how much does the goldfish cost? **5p**

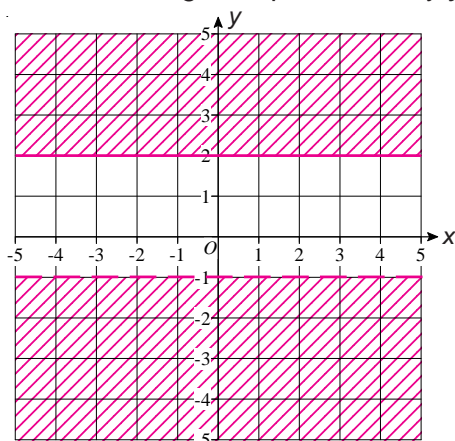
A27_{a/b}

Regions Answers

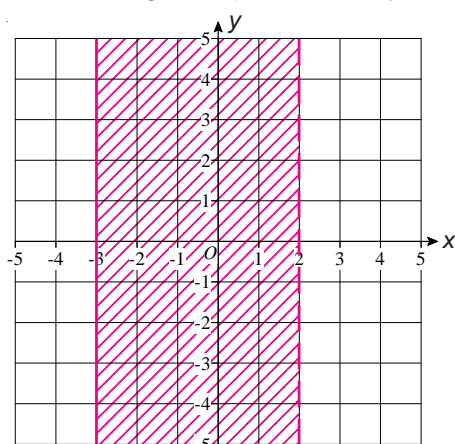
- 1) a) Shade the region represented by $x \leq -1$
b) Shade the region represented by $x > 3$



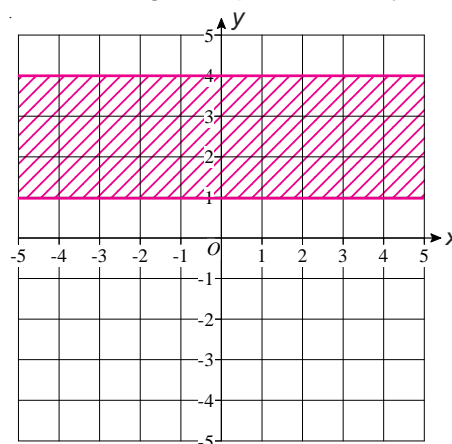
- 2) a) Shade the region represented by $y < -1$
b) Shade the region represented by $y \geq 2$



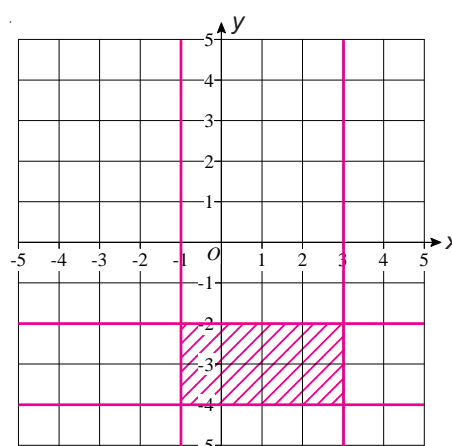
- 3) Shade the region represented by $-3 \leq x < 2$



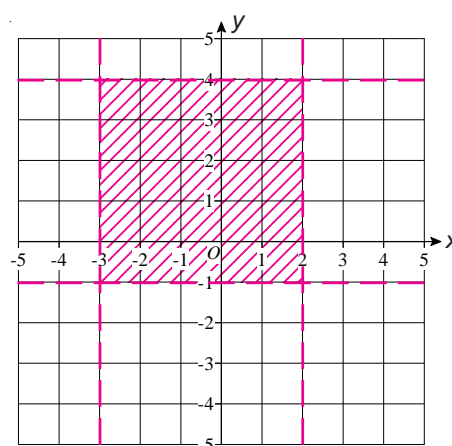
- 4) Shade the region represented by $1 \leq y \leq 4$



- 5) Shade the region where $-1 \leq x \leq 3$
and $-4 \leq y \leq -2$



- 6) Shade the region where $-3 < x < 2$
and $-1 < y < 4$



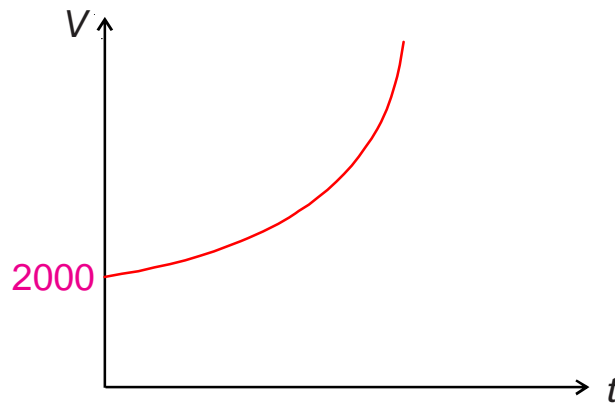
A28

Exponential and Reciprocal Graphs Answers

- 1) A guitar was valued at £2000 on January 1st 1990.

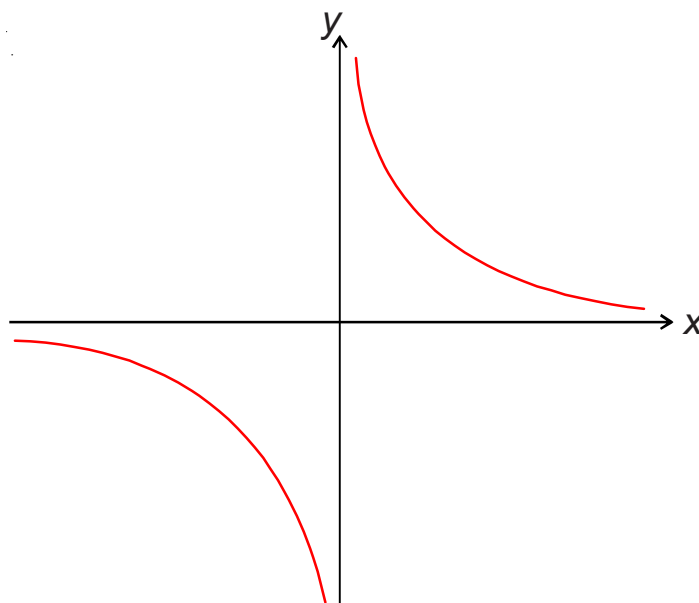
The value of the guitar is given by $V = 2000 \times 1.03^t$
where £ V is the value t years after 1st Jan 1990.

- a) Sketch the graph of $V = 2000 \times 1.03^t$ on the axes below,
marking clearly where the graph crosses the y -axis.



- b) Use your calculator to work out the value of the guitar
on 1st January 1995. **£2318.55**
- c) Use your calculator to work out the value of the guitar
on 1st January 1987. **£1830.28**

- 2) Sketch the graph of $y = \frac{1}{x}$ on the axes below.



R11_{a/b} Compound Measures

Answers

- 1) A car travels at 60 mph for 3 hours.
How far does the car travel? **180 miles**
- 2) A cyclist cycles for 4 hours and covers a distance of 48 miles.
What was her average speed in miles per hour? **12 mph**
- 3) How long would it take a train which travels at an average speed of 80 mph to cover a distance of 400 miles? **5 hours**
- 4) A runner runs at a speed of 12 km/h for 3 hours and 15 minutes.
How far does he run? **39 km**
- 5) An aeroplane flies at an average speed of 510 mph.
How long would it take to fly a distance of 2720 miles? **5 hours and 20 minutes**
- 6) If a worm travels a distance of 8.25 m in 2 hours and 45 minutes, work out his average speed in metres per hour. **3 metres per hour**
- 7) 12.5 cm³ of mercury has a mass of 170 g.
Work out the density of mercury. **13.6 g/cm³**
- 8) Platinum has a density of 21.4 g/cm³.
What is the mass of 35 cm³ of platinum? **749 g**
- 9) A quantity of ice had a mass of 62.56 g.
Knowing that ice has a density of 0.92 g/cm³, work out how much ice there was, in cm³. **68 cm³**
- 10) 15000 cm³ of nitrogen has a mass of 18.765 g.
Work out the density of nitrogen in g/cm³. **0.001251 g/cm³**
- 11) 15000 cm³ of gold has a mass of 289.5 kg.
Work out the density of gold in g/cm³. **19.3 g/cm³**

R12

Original-Value Problems Answers

- 1) A shop has 25% off its prices in a sale.
Below are the sale prices of some items.
Find the original price of each item.
- a) £3.60 £4.80
 - b) £4.80 £6.40
 - c) £21.00 £28.00
 - d) £15.30 £20.40
 - e) £99.00 £132.00
 - f) £12.90 £17.20
- 2) A shop has 20% off its prices in a sale.
Below are the sale prices of some items.
Find the original price of each item.
- a) £4.00 £5.00
 - b) £4.80 £6.00
 - c) £12.00 £15.00
 - d) £16.40 £20.50
 - e) £120.00 £150.00
 - f) £192.00 £240.00
- 3) A shop has 15% off its prices in a sale.
Below are the sale prices of some items.
Find the original price of each item.
- a) £17.00 £20.00
 - b) £51.00 £60.00
 - c) £42.50 £50.00
 - d) £84.15 £99.00
 - e) £52.70 £62.00
 - f) £83.30 £98.00

R13 Inverse Proportion

Answers

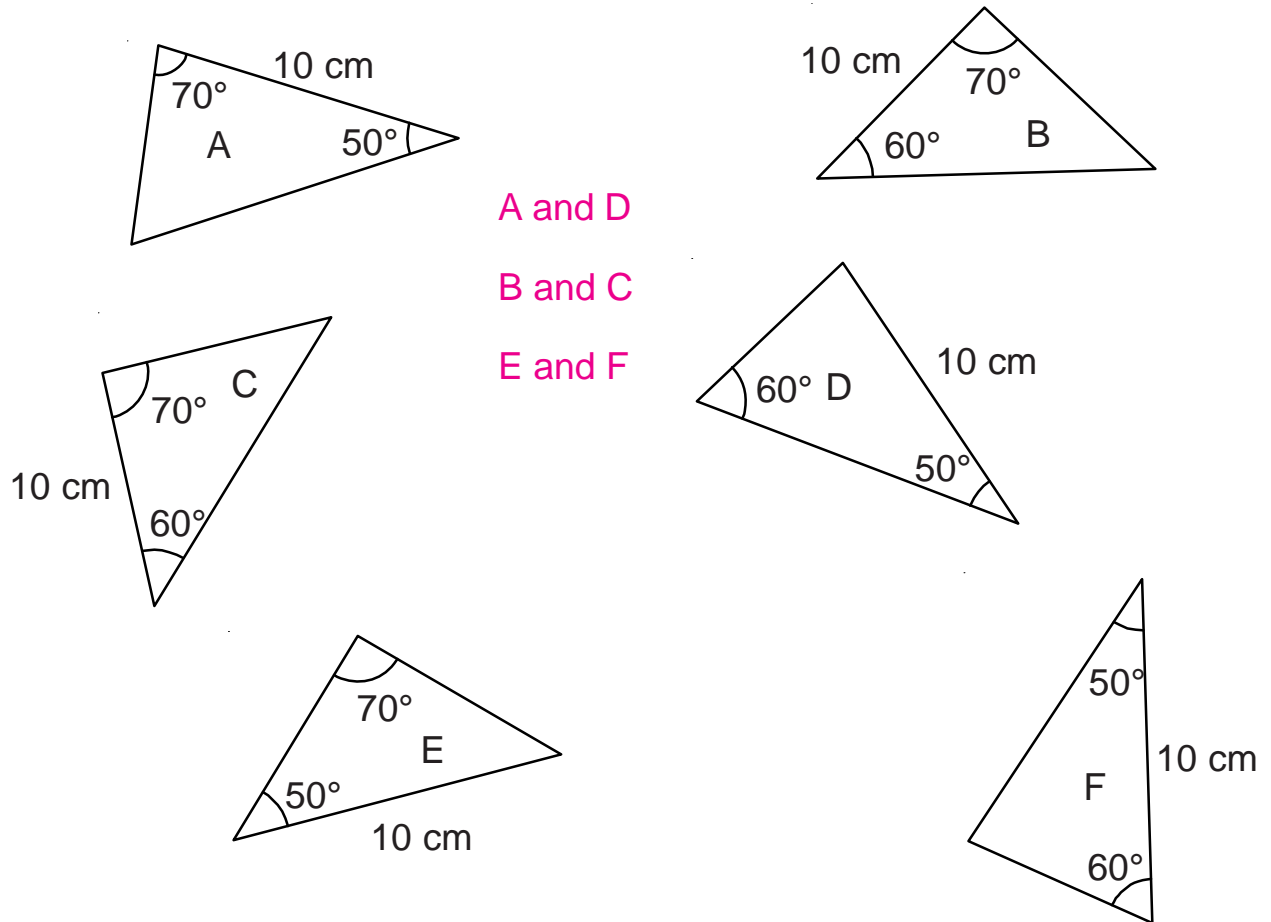
- 1) 3 people can paint a room in 2 hours.
 - a) How long would it take 1 person? 6 hours
 - b) How long would it take 2 people? 3 hours
 - c) How long would it take 6 people? 1 hour
 - d) How long would it take 8 people? 45 minutes

- 2) 5 people can harvest all of the apples in an orchard in 12 hours.
 - a) How long would it take 1 person? 60 hours
 - b) How long would it take 12 people? 5 hours
 - c) How long would it take 2 people? 30 hours
 - d) How long would it take 9 people? 6 hours 40 minutes

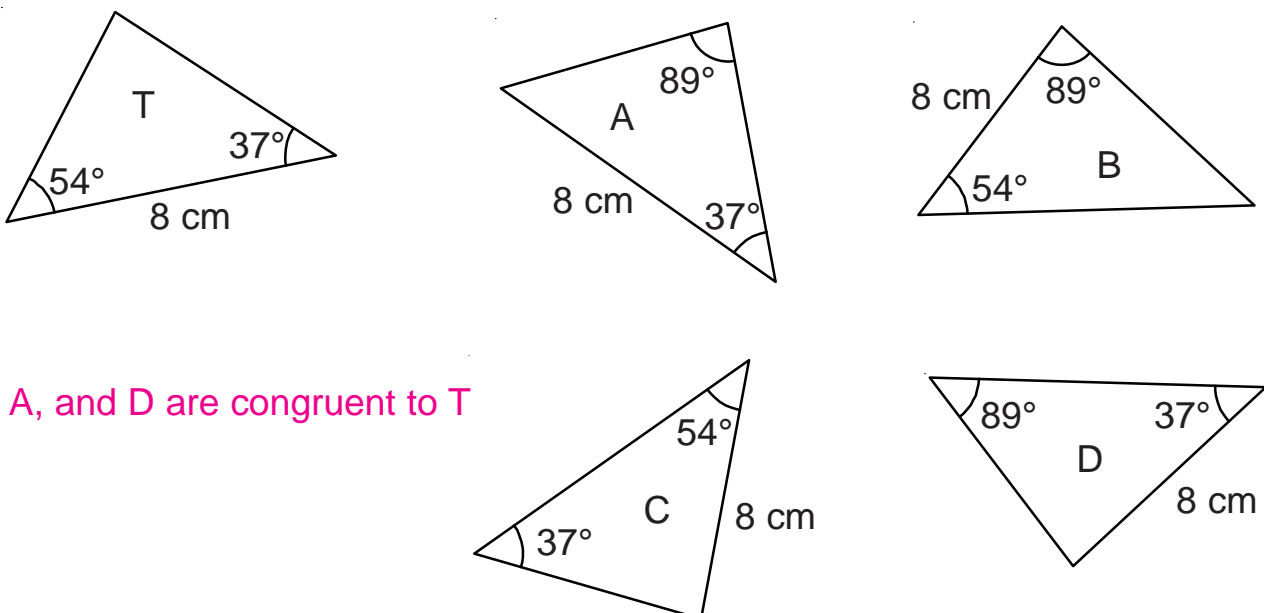
G31 Congruent Triangles

Answers

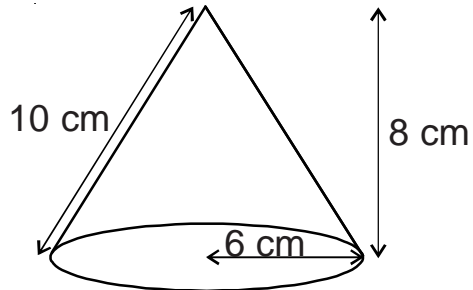
1) Sort these six triangles into 3 congruent pairs.



2) Which of the following triangles are congruent to triangle T?



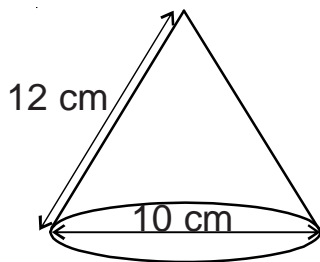
- 1) Here is a cone.



Find:

- a) the volume 301.6 cm^3
- b) the curved surface area 188.5 cm^2
- c) the total surface area 301.6 cm^2

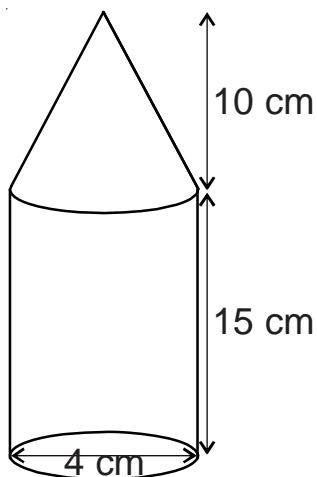
- 2) Here is a cone.



Find the total surface area. 267.1 cm^2

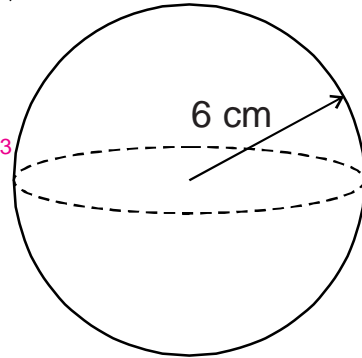
- 3) A child's rocket is made from a cone and a cylinder.

Find the total volume of the toy rocket. 230.4 cm^3



1) Find

- a) the volume of the sphere 904.9 cm^3
- b) the surface area of the sphere 452.4 cm^2



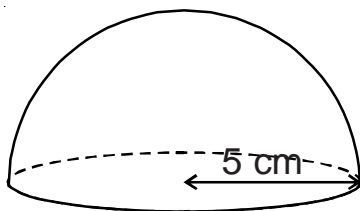
2) Find the volume of

- a) a sphere with radius 10 cm 4189.3 cm^3
- b) a sphere with diameter 16 cm 2144.9 cm^3

3) Find the surface area of

- a) a sphere with radius 9 cm 1018.0 cm^2
- b) a sphere with diameter 20 cm 1256.8 cm^2

4) Here is a hemisphere

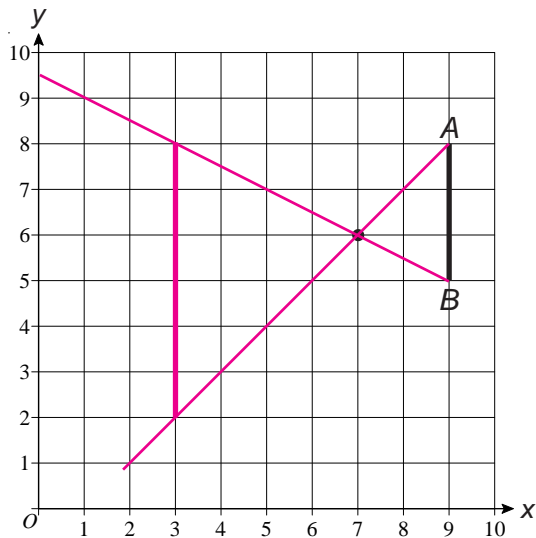


Find

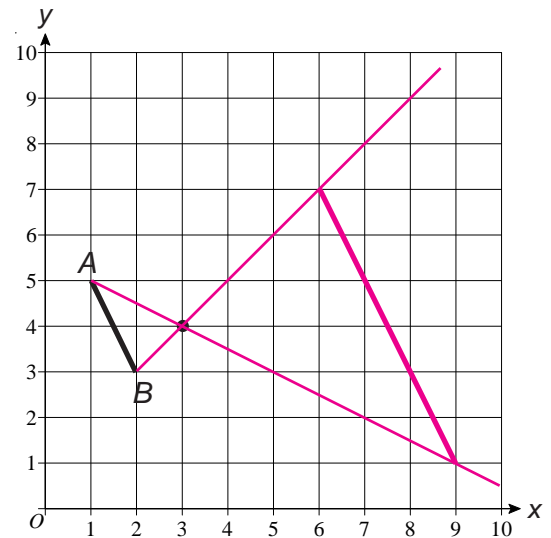
- a) the volume of the hemisphere 261.8 cm^3
- b) the total surface area of the hemisphere 235.7 cm^2

G34 Enlargement Negative Scale Factor Answers

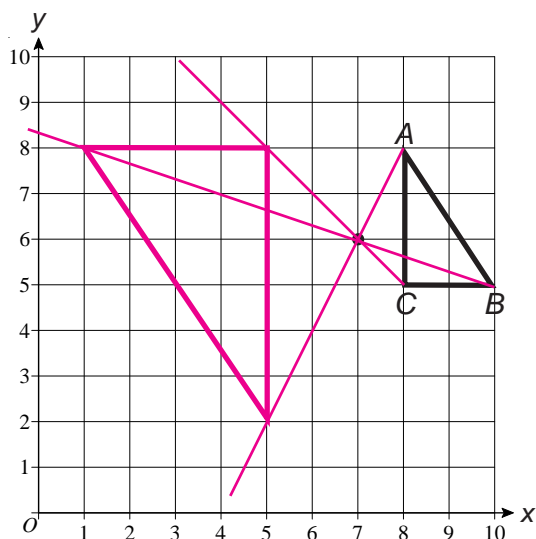
- 1) Enlarge line AB with scale factor -2 and point $(7, 6)$ as the centre of enlargement.



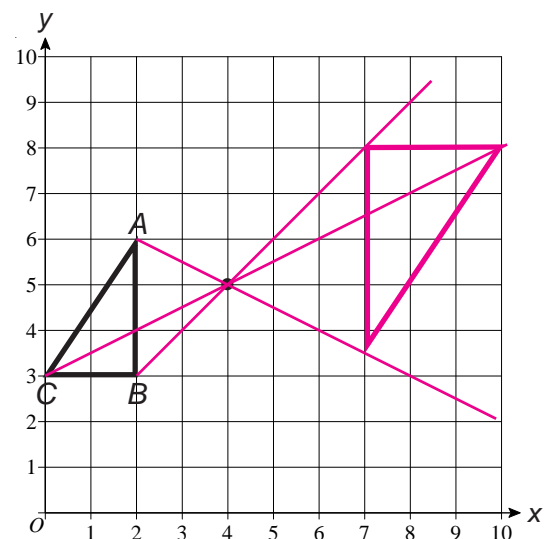
- 2) Enlarge line AB with scale factor -3 and point $(3, 4)$ as the centre of enlargement.



- 3) Enlarge triangle ABC with scale factor -2 and point $(7, 6)$ as the centre of enlargement.



- 4) Enlarge triangle ABC with scale factor -1.5 and point $(4, 5)$ as the centre of enlargement.

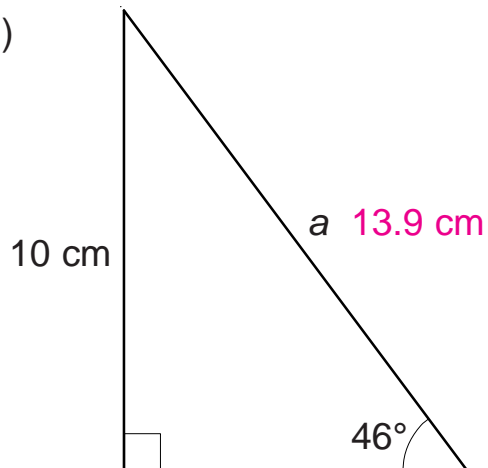


G35a

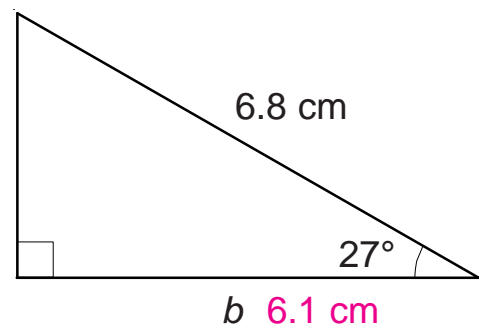
Trigonometry Finding a Side Answers

Find the lengths of the missing sides, giving your answers to 1 decimal place,

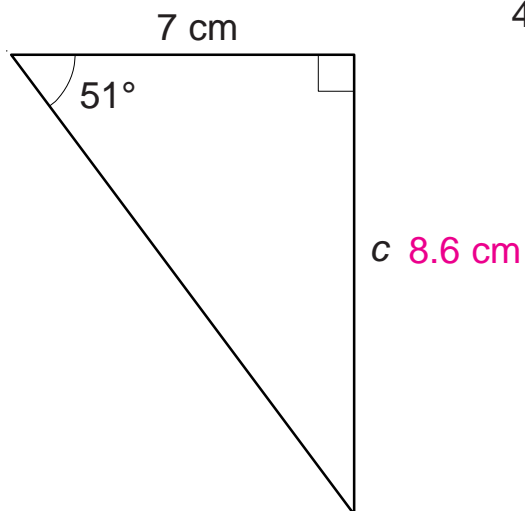
1)



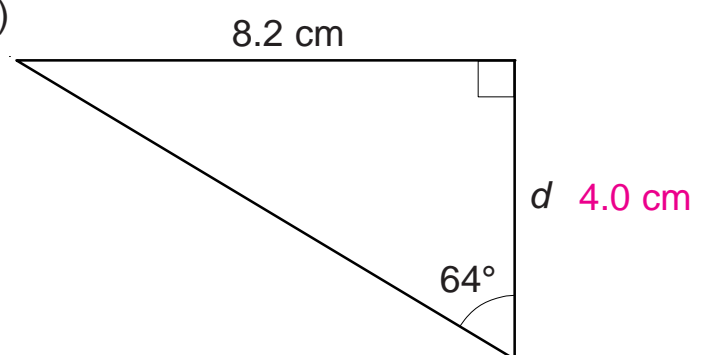
2)



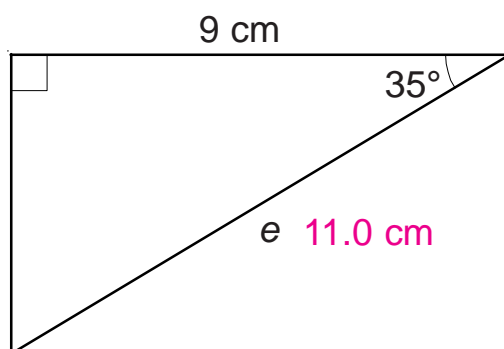
3)



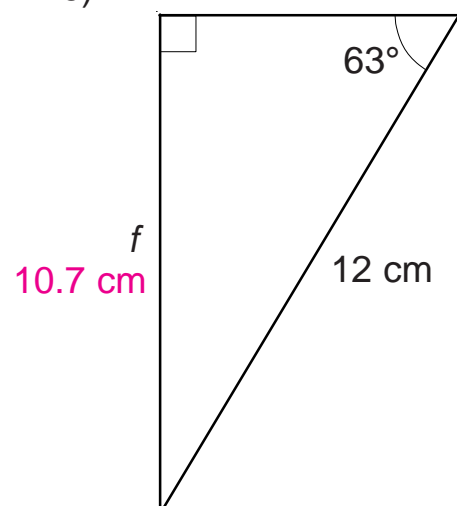
4)



5)



6)

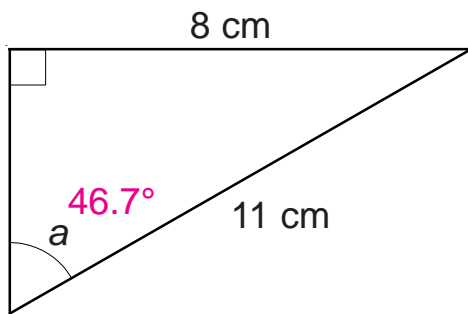


G35b

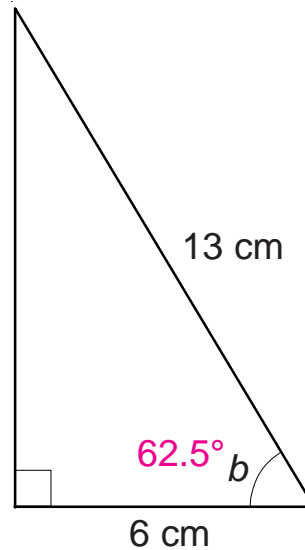
Trigonometry Finding an Angle Answers

Find the sizes of the angles marked with letters, giving your answers to 1 decimal place,

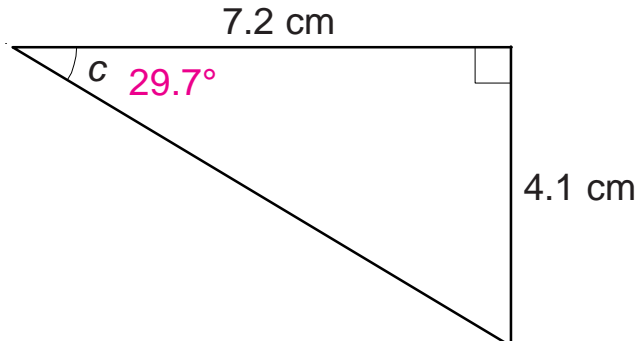
1)



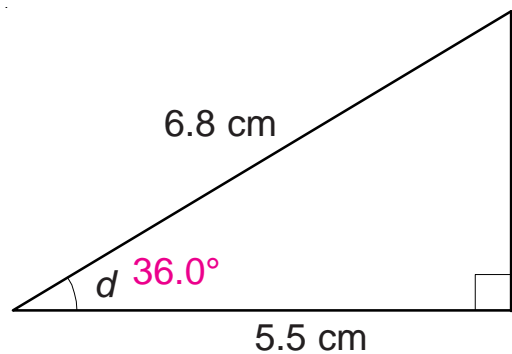
2)



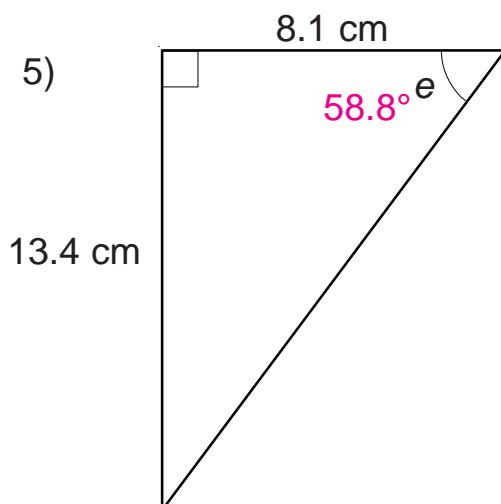
3)



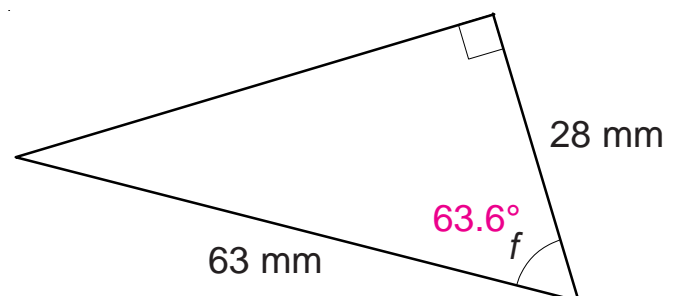
4)



5)



6)



P7

Relative Frequency

Answers

- 1) Peter bought an unfair dice from a Joke Shop.
He didn't know how the dice was biased and so he rolled it 100 times and noted down which numbers came up.
He found that the number 6 occurred 8 times.
- a) What is the relative frequency of getting a six? 0.08 or $\frac{8}{100}$
- b) If Peter rolls the dice 400 times, estimate how many 6s he will roll. 32

- 2) Mary had a bag containing four different colour marbles.
She chose a marble, noted its colour and then replaced it, 80 times.

The results can be seen in this table.

| Colour | No. of times chosen |
|--------|---------------------|
| Red | 12 |
| Blue | 24 |
| Green | 18 |
| Yellow | 26 |

- a) Estimate the probability that a blue marble will be chosen on the next pick. $\frac{24}{80}$ or 0.3
- b) If a marble is chosen and replaced 280 times, estimate how many times you would expect to choose a red marble. 42 times
- 3) Benford's law says that if you look at real-life sources of data (heights of mountains, populations of countries, etc) the number 1 will be the first digit with relative frequency 0.3
If you go through any newspaper and write down the first 20 numbers you come across, about how many of the numbers would you expect to begin with a '1'. 6

S10a

Averages from Tables Mode, Median, Mean Answers

Sally conducted a survey to see how many sandwiches each pupil brought to school in her class per day.
The results can be seen in the table.

| No. of sandwiches | Frequency |
|-------------------|-----------|
| 0 | 1 |
| 1 | 5 |
| 2 | 6 |
| 3 | 12 |
| 4 | 2 |

- a) What is the modal number of sandwiches brought to school? **3 sandwiches**
- b) What is the median number of sandwiches brought to school? **3 sandwiches**
- c) Work out the mean number of sandwiches brought to school. **2.3 sandwiches**
Give your answer to 1 decimal place.

S10b

Averages from Tables Estimate for the Mean Answers

- 1) 50 hippos were captured over the course of a year and weighed. The results can be seen in the table, below.

| Weight of hippo in tonnes | Frequency |
|---------------------------|-----------|
| $1.4 \leq w < 1.7$ | 5 |
| $1.7 \leq w < 2.0$ | 9 |
| $2.0 \leq w < 2.3$ | 15 |
| $2.3 \leq w < 2.6$ | 12 |
| $2.6 \leq w < 2.9$ | 7 |
| $2.9 \leq w < 3.2$ | 2 |

Work out an estimate for the mean weight of a hippo. Give your answer to 1 decimal place.

2.2 tonnes

- 2) Jenny had a theory that if asked to guess the length of a line, children under the age of 10 would overestimate the length but adults would underestimate the length.

To help her decide if she was correct she asked 100 under-10s and 100 adults to guess the length of a 34 cm line.

The results can be seen in the two tables, below.

Children under the age of 10 estimates

| Estimate of length in cm | Frequency |
|--------------------------|-----------|
| $20 \leq l < 24$ | 4 |
| $24 \leq l < 28$ | 11 |
| $28 \leq l < 32$ | 24 |
| $32 \leq l < 36$ | 39 |
| $36 \leq l < 40$ | 22 |

Estimate for the mean length is 32.56 cm

Adult estimates

| Estimate of length in cm | Frequency |
|--------------------------|-----------|
| $20 \leq l < 24$ | 2 |
| $24 \leq l < 28$ | 6 |
| $28 \leq l < 32$ | 16 |
| $32 \leq l < 36$ | 62 |
| $36 \leq l < 40$ | 14 |

Estimate for the mean length is 33.2 cm

Use the results in the tables to see if Jenny was correct.

Show all your workings. The estimate for the mean for under-10s show that, on average, they underestimated the length by 1.44 cm. On average, the adults underestimated by 0.8 cm. Therefore, Jenny is not correct because both groups underestimated the length of the line.