GCSE MATHS

Number B

Name: .....

Teacher: .....

Class: .....

Contents

Fractions

Learning outcomes

1. Calculate a fraction of an amount

2. Write one amount as a fraction of another

3. Answer fraction questions in context

Starter activity

Use the 'bus stop' method to complete the division calculations

a) 138 ÷ 6 =

b) 200 ÷ 5 =

c) 387 ÷ 9 =

d) 315 ÷ 7 =

e) 248 ÷ 8 =

f) 534 ÷ 3 =

Fractions

Activity 1

Calculate the fraction of amounts

a) $\frac{1}{2}$ of $10 =$

b) $\frac{1}{3}$ of $18 =$

c) $\frac{1}{4}$ of $24 =$

d) $\frac{2}{3}$ of $45 =$

e) $\frac{7}{10}$ of $20 =$

f) $\frac{2}{5}$ of $30 =$

g) $\frac{3}{10}$ of $32 =$

h) $\frac{3}{4}$ of $57 =$

i) $\frac{2}{5}$ of $7 =$

a) $\frac{1}{5}$ of an amount is 8. What was the original amount?

b) $\frac{3}{7}$ of an amount is 15. What was the original amount?

SCORE __ / 11

Activity 2

Write the first amount as a fraction of the other. Give your answer in its simplest form

1. a) **40** as a fraction of **50**

b) **14** as a fraction of **21**

c) **45** as a fraction of **70**

d) **36** as a fraction of **63**

(This activity continues on the next page)

Fractions

Activity 2

e) **27** as a fraction of **45**

f) **24** as a fraction of **54**

g) **28** as a fraction of **84**

h) 750**m** as a fraction of **3km**

2. In a school of 280 students 120 are boys. What fraction of the school are girls?

SCORE __ / 10

Activity 3

Answer the questions

1. David earns £800 per month. He spends $\frac{1}{4}$ of this money on rent. He also spends $\frac{2}{5}$ of the money on food and bills. How much money does he have left?

2. John is 80 years old. His son Mark is $\frac{5}{8}$ of his age. His granddaughter, Helen, is $\frac{1}{5}$ of his age. How many years older than Helen is Mark?

SCORE __ / 6

Fractions

Plenary - What have I learnt today?

Add and Subtract Fractions

Learning outcomes

1. Recognise and use equivalent fractions

2. Add and subtract fractions with the same denominator

3. Add and subtract fractions with the different denominators

4. Add and subtract mixed numbers

Starter activity

Write the fractions in their lowest term

1. $\frac{3}{9} = \frac{\square}{\square}$

2. $\frac{5}{20} = \frac{\square}{\square}$

3. $\frac{8}{16} = \frac{\square}{\square}$

4. $\frac{9}{45} = \frac{\square}{\square}$

5. $\frac{30}{40} = \frac{\square}{\square}$

6. $\frac{21}{35} = \frac{\square}{\square}$

Add and Subtract Fractions

Activity 1

Find the equivalent fractions

1. $\frac{2}{3} = \frac{\square}{12}$
2. $\frac{4}{5} = \frac{\square}{30}$
3. $\frac{1}{3} = \frac{\square}{18}$
4. $\frac{2}{5} = \frac{\square}{45}$
5. $\frac{3}{7} = \frac{\square}{35}$
6. $\frac{\square}{3} = \frac{2}{6}$
7. $\frac{\square}{10} = \frac{6}{20}$
8. $\frac{3}{\square} = \frac{9}{30}$

SCORE __ / 8

Activity 2

Add or subtract the fractions

1. $\frac{3}{7} + \frac{2}{7} =$
2. $\frac{5}{9} + \frac{2}{9} =$
3. $\frac{6}{7} - \frac{2}{7} =$
4. $\frac{3}{5} - \frac{2}{5} =$

1. $\frac{\square}{\square} + \frac{7}{12} = \frac{11}{12}$
2. $\frac{2}{7} + \frac{\square}{\square} = \frac{6}{7}$
3. $\frac{\square}{\square} + \frac{9}{14} = \frac{13}{14}$
4. $\frac{\square}{\square} - \frac{3}{13} = \frac{8}{13}$
5. $\frac{7}{10} - \frac{\square}{\square} = \frac{3}{10}$
6. $\frac{11}{12} - \frac{\square}{\square} = \frac{7}{12}$

SCORE __ / 10

Add and Subtract Fractions

Activity 3

Add and subtract the fractions. Give your answers in their simplest form

(2 marks each)

1. $\frac{5}{9}+\frac{5}{36}=$
2. $\frac{4}{7}+\frac{2}{21}=$
3. $\frac{8}{12}+\frac{5}{48}=$
4. $\frac{2}{6}-\frac{2}{18}=$
5. $\frac{4}{9}-\frac{1}{3}=$
6. $\frac{7}{10}-\frac{2}{5}=$
7. $\frac{2}{7}+\frac{1}{2}=$
8. $\frac{1}{4}+\frac{4}{7}=$
9. $\frac{1}{4}+\frac{2}{3}=$
10. $\frac{9}{10}-\frac{5}{6}=$
11. $\frac{3}{5}-\frac{3}{7}=$
12. $\frac{23}{24}-\frac{7}{10}=$

SCORE __ / 24

Activity 4

Add and subtract the fractions. Give your answers in their simplest form

(3 marks each)

1. $2\frac{1}{4}+3\frac{1}{2}=$
2. $7\frac{1}{2}+5\frac{3}{4}=$
3. $8\frac{1}{2}+3\frac{1}{4}=$

(This activity continues on the next page)

Add and Subtract Fractions

Activity 4

1. $3\frac{3}{4} - 2\frac{1}{3} =$

2. $10\frac{1}{2} - 5\frac{3}{4} =$

3. $6\frac{1}{10} - 4\frac{3}{5} =$

SCORE __ / 18

Plenary - What have I learnt today?

Multiply and Divide Fractions

Learning outcomes

1. Understand and find reciprocals of fractions

2. Multiply proper fractions and mixed numbers

3. Divide proper fractions and mixed numbers

4. Multiply and divide fractions in context

Starter activity

Change the mixed numbers to improper fractions

1. $2\frac{1}{3} = \frac{\square}{\square}$

2. $2\frac{3}{5} = \frac{\square}{\square}$

3. $1\frac{9}{10} = \frac{\square}{\square}$

Change the improper fractions to mixed numbers

4. $\frac{7}{4} = \frac{\square}{\square}$

5. $\frac{9}{2} = \frac{\square}{\square}$

6. $\frac{10}{3} = \frac{\square}{\square}$

Multiply and Divide Fractions

Activity 1

Find the reciprocal of each of the fractions. Leave as improper fractions

1. $\frac{1}{2} = \frac{\square}{\square}$

2. $\frac{4}{7} = \frac{\square}{\square}$

3. $\frac{11}{13} = \frac{\square}{\square}$

4. $\frac{c}{d} = \frac{\square}{\square}$

SCORE __ / 4

Activity 2

Complete the multiplications. Give your answer in their lowest terms

1. a) $8 \times \frac{1}{4} =$ b) $12 \times \frac{2}{3} =$ c) $80 \times \frac{2}{9} =$

2. a) $\frac{1}{6} \times \frac{1}{3} =$ b) $\frac{4}{5} \times \frac{2}{7} =$ c) $\frac{5}{12} \times \frac{3}{4} =$

3. a) $2\frac{2}{5} \times 1\frac{2}{3} =$ b) $3\frac{4}{9} \times 1\frac{7}{8} =$ c) $4\frac{3}{10} \times 3\frac{5}{6} =$

SCORE __ / 9

Multiply and Divide Fractions

Activity 3

Complete the multiplications. Give your answer in their lowest terms

1. a) $3 \div \frac{1}{4} =$ b) $3 \div \frac{1}{5} =$ c) $\frac{2}{3} \div 6 =$

2. a) $\frac{1}{5} \div \frac{2}{3} =$ b) $\frac{2}{7} \div \frac{5}{6} =$ c) $\frac{3}{4} \div \frac{9}{16} =$

3. a) $1\frac{1}{3} \div \frac{2}{5} =$ b) $1\frac{1}{4} \div 1\frac{1}{5} =$ c) $2\frac{2}{3} \div 1\frac{1}{4} =$

SCORE __ / 9

Activity 4

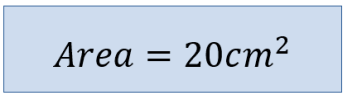
Answer the questions

1. a) Calculate the area of the rectangle

$\frac{7}{9}m$

$\frac{1}{5}m$

b) Calculate the length of the side marked



$2\frac{1}{6}cm$

x

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Multiply and Divide Fractions

Activity 4

2. James needs 6 sections of plastic piping $1\frac{3}{4}$ m in length. He has 10m of piping. Does he have enough piping?

SCORE __ / 6

Plenary - What have I learnt today?

Fractions and Decimals

Learning outcomes

1. Convert fractions to decimals

2. Convert terminating decimals to fractions

3. Convert between recurring decimals and fractions

Starter activity

Rewrite the fractions in their simplest form

a) $\frac{9}{54}$ =

b) $\frac{15}{36}$ =

c) $\frac{21}{35}$ =

d) $\frac{24}{64}$ =

e) $\frac{45}{165}$ =

f) $\frac{70}{182}$ =

Fractions and Decimals

Activity 1

Convert the fractions to decimals

a) $\frac{3}{50}$ =

b) $\frac{9}{10}$ =

c) $\frac{18}{25}$ =

d) $\frac{17}{20}$ =

e) $\frac{1}{8}$ =

f) $\frac{3}{4}$ =

SCORE __ / 6

Activity 2

Convert the decimals to fractions. Write your answers in the simplest form

1. a) 0.3 = b) 0.8 = c) 0.95 = d) 0.15 =

2. a) 0.16 = b) 0.98 = c) 0.08 = d) 0.13 =

3. a) 0.28 = b) 0.065 = c) 0.466 = d) 1.25 =

SCORE __ / 12

Fractions and Decimals

Activity 3

1. Convert the fractions to recurring decimals

a) $\frac{4}{9}$ =

b) $\frac{5}{6}$ =

c) $\frac{6}{11}$ =

2. Convert the recurring decimals to fractions

a) $0.\dot{3}$ =

b) $0.\dot{8}$ =

c) $0.\dot{1}\dot{2}$ =

d) $0.\dot{7}\dot{8}$ =

e) $0.46\dot{6}$ =

f) $0.5\dot{2}$ =

SCORE __ / 24

Fractions and Decimals

Plenary - What have I learnt today?

Introduction to Percentages

Learning outcomes

1. Convert percentages to fractions and decimals

2. Convert fractions and decimals to percentages

3. Order fractions, decimals and percentages

Starter activity

1. Put the decimals in ascending order

a) 0.3, 0.03, 0.31, 0.301, 0.33

b) 0.109, 0.019, 0.011, 0.09

2. Put the fractions in ascending order

a) $\frac{3}{7}, \frac{5}{7}, \frac{1}{7}, \frac{6}{7}, \frac{2}{7}$

b) $\frac{1}{6}, \frac{1}{10}, \frac{1}{2}, \frac{1}{8}, \frac{1}{3}$

Introduction to Percentages

Activity 1

Convert each percentage
a) to a fraction (in its simplest form) and
b) to a decimal

a) 21% b) 39% c) 80%

d) 30% e) 64% f) 82%

g) 6% h) 105% i) 200%

SCORE __ / 18

Activity 2

1. Convert the fractions to percentages

a) $\frac{22}{100}$ = b) $\frac{3}{50}$ = c) $\frac{9}{10}$ = d) $\frac{17}{20}$ = e) $\frac{1}{8}$ =

2. Convert the decimals to percentages

a) 0.91 = b) 0.7 = c) 0.08 = d) 1.25 = e) 0.0385 =

SCORE __ / 10

Introduction to Percentages

Activity 3

Put the numbers in order from smallest to largest

a) $0.42,\ 35\%,\ \frac{2}{5}$

b) $0.15, 22\%,\ \frac{1}{5}$

c) $\frac{11}{25},\ 0.43,\ 42\%$

d) $\frac{1}{8},\ 10\%, 0.13$

SCORE __ / 8

Introduction to Percentages

Plenary - What have I learnt today?

Power and Roots

Learning outcomes

1. Recognise square numbers up to 15 x 15 and powers of 2,3,4 and 5

2. Use index notation

3. Estimate powers and roots of positive numbers

Starter activity

Complete the multiplication calculations

a) 3 x 5 =

b) 6 x 7 =

c) 9 x 12 =

d) 13 x 10 =

e) 11 x 14 =

f) 15 x 9 =

g) 3 x 5 x 8 =

h) 6 x 9 x 11 =

i) 12 x 13 x 14 =

Power and Roots

Activity 1

Complete the calculations

a) $1^2 =$ b) $2^2 =$ c) $3^2 =$ d) $4^2 =$

e) $5^2 =$ f) $6^2 =$ g) $7^2 =$ h) $8^2 =$

i) $9^2 =$ j) $10^2 =$ k) $11^2 =$ l) $12^2 =$

m) $13^2 =$ n) $14^2 =$ o) $15^2 =$ p) $1^3 =$

q) $2^3 =$ r) $3^3 =$ s) $4^3 =$ t) $5^3 =$

a) $\sqrt{81} =$

b) $\sqrt{64} =$

c) $\sqrt[3]{27} =$

d) $\sqrt[3]{64} =$

SCORE __ / 24

Activity 2

Write the calculations as powers

a) $8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 =$

b) $s \times s \times s \times s \times s =$

c) $9.2 \times 9.2 \times 9.2 =$

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Power and Roots

Activity 2

Write the powers as calculations

a) $11^6 =$

b) $t^3 =$

c) $3.8^5 =$

Find the value without a calculator

a) $(-6)^3 =$

b) $2.5^2 =$

c) $5^3 + 4^2 =$

Find the value with a calculator

a) $2.9^2 =$

b) $(-4.6)^3 =$

c) $6.1^2 + 1.8^5 =$

SCORE __ / 24

Activity 3

Use your knowledge of powers and roots to find estimates of the calculations. Give a reason for your answer. Do not use a calculator.

1. a) $3.2^2 =$

b) $6.5^2 =$

(This activity continues on the next page)

Power and Roots

Activity 3

c) 2.7^3 =

d) 8.6^2 =

2. a) $\sqrt{110}$ =

b) $\sqrt{72}$ =

c) $\sqrt[3]{50}$ =

d) $\sqrt[3]{20}$ =

SCORE __ / 8

Plenary - What have I learnt today?

Calculate with Powers and Roots

Learning outcomes

1. Multiply and divide with powers of 10

2. Apply rules for multiplying powers

3. Apply rules for dividing powers

Starter activity

Complete the calculations without using a calculator

a) $3^2 =$

b) $12^2 =$

c) $15^2 =$

d) $2^3 =$

e) $5^3 =$

f) $2^4 =$

g) $2^3 \times 5^2 =$

h) $6^2 + 4^3 =$

i) $7^2 - 3^3 =$

Calculate with Powers and Roots

Activity 1

Complete the calculations

a) $3 \times 10^2 =$ b) $22 \times 10^1 =$ c) $9.3 \times 10^3 =$

d) $6 \times 10^0 =$ e) $7.3 \times 10^4 =$ f) $5.275 \times 10^3 =$

g) $5 \times 10^{-2} =$ h) $2.8 \times 10^{-3} =$ i) $3.652 \times 10^{-1} =$

j) $6 \div 10^2 =$ k) $3.4 \div 10^5 =$ l) $0.65 \div 10^3 =$

SCORE __ / 12

Activity 2

Write as single powers

1. a) $2^4 \times 2^5 =$ b) $3^6 \times 3^4 =$ c) $5^3 \times 5^4 =$

d) $7^5 \times 7^3 =$ e) $9^6 \times 9^2 =$ f) $2^5 \times 2 =$

2. a) $(3^3)^4 =$ b) $(2^5)^3 =$ c) $(4^2)^6 =$

3. a) $(4^2)^3 \times 4^4 =$ b) $(2^3)^2 \times 2^7 =$ c) $(4^3)^4 \times 4^5 =$

SCORE __ / 12

Calculate with Powers and Roots

Activity 3

Write as single powers

1. a) $\frac{3^5}{3^4} =$ b) $\frac{2^6}{2^4} =$ c) $\frac{4^7}{4^2} =$

d) $\frac{3^8}{3} =$ e) $\frac{7^5}{7^2} =$ f) $\frac{2^9}{2^8} =$

2. a) $\frac{3^5 \times 3^2}{3^3} =$ b) $\frac{2^5 \times 2^3}{2^6} =$ c) $\frac{4^7 \times 4^3}{4} =$

d) $\frac{3^3 \times 3^5}{3^4 \times 3^2} =$ e) $\frac{7^5 \times 7^3}{7^2 \times 7^4} =$ f) $\frac{2^3 \times 2^4}{2^2 \times 2^5} =$

SCORE __ / 18

Calculate with Powers and Roots

Plenary - What have I learnt today?

Standard Form

Learning outcomes

1. Understand why numbers are written in standard form and be able to recognise them

2. Convert numbers written in standard form into ordinary numbers

3. Write numbers in standard form

4. Solve contextual problems using standard form

Starter activity

Can you fill in these gaps

10^6 =

10^5 =

10^4 =

$10^3 = 1000$

10^2=

10^1=

10^0=

$10^{-1} = 0.1$

10^{-2}=

10^{-3}=

Standard Form

Activity 1

Are these in standard form?

1. 4.9×10^{6}
2. 3.7×100^{-2}
3. 0.4×10^{9}
4. 5×10^{3}
5. $12.3 \times 10^{5.7}$
6. 11×10^{4}
7. 1.34×10^{-2}
8. 9.547×10^{87}
9. $0.86 \times 10^{0.7}$
10. 4.5×10^{8}

SCORE __ / 10

Activity 2

Convert these into ordinary numbers

1. $8.1 \times 10^{2} =$
2. $6.589 \times 10^{5} =$
3. $7.2 \times 10^{3} =$
4. $1.96 \times 10^{4} =$
5. $2.53 \times 10^{6} =$
6. $7.18 \times 10^{-4} =$
7. $5 \times 10^{-3} =$
8. $3.12 \times 10^{-4} =$
9. $4.54 \times 10^{-7} =$
10. $9.997 \times 10^{-2} =$

SCORE __ / 10

Standard Form

Activity 3

Write these numbers in standard form

1. 540000 =
2. 370 =
3. 98560000 =
4. 13200 =
5. 20000000000 =
6. 0.00000045 =
7. 0.00679 =
8. 0.0000000002 =
9. 0.000054 =
10. 0.14 =

Extension: What is 145.7 million in standard form?

SCORE __ / 11

Activity 4

Solve these problems using standard form

1. The mass of Jupiter is approximately 1.9×10^{27} kg. Write this as an ordinary number

2. The population of the UK is approximately 66.04 million. 21% of the population are under 18. How many people are under 18 in the UK? Give your answer as an ordinary number and in standard form.

SCORE __ / 2

Standard Form

Plenary - What have I learnt today?

Standard Form - Calculations

Learning outcomes

1. Multiply and divide with numbers in standard form

2. Add and subtract with numbers in standard form

3. Calculate with numbers in standard form to solve contextual problems

Starter activity

Use the rules of indices to solve these

1. $3^6 \times 3^4 =$

2. $5^4 \div 5^2 =$

3. $a^{19} \times a^6 =$

4. $4 \times 4^6 =$

5. $b^7 \times b^2 =$

6. $10^{12} \div 10^{14} =$

7. $y^{-2} \times y^{-4} =$

8. $\frac{7^{20}}{7^{14}} =$

Standard Form - Calculations

Activity 1

Calculate the following giving your answers in standard form

1. $(4 \times 10^{5}) \times (6.2 \times 10^{3}) =$

2. $(3.3 \times 10^{-2}) \times (2 \times 10^{7}) =$

3. $(4.1 \times 10^{11}) \times (3 \times 10^{12}) =$

4. $(7 \times 10^{-4}) \times (9 \times 10^{-6}) =$

5. $(5.3 \times 10^{16}) \times (4 \times 10^{-9}) =$

6. $(1.6 \times 10^{2}) \div (4 \times 10^{9}) =$

7. $(2.7 \times 10^{2}) \div (3 \times 10^{6}) =$

8. $(4.8 \times 10^{-11}) \div (2.2 \times 10^{3}) =$

9. $(1.8 \times 10^{14}) \div (9 \times 10^{8}) =$

10. $(3.6 \times 10^{20}) \div (4 \times 10^{-7}) =$

SCORE __ / 10

Activity 2

Calculate the following giving your answers in standard form

1. $(8.17 \times 10^{5}) + (8.58 \times 10^{7}) =$

2. $(7.19 \times 10^{-6}) - (3.29 \times 10^{-6}) =$

3. $(3.14 \times 10^{9}) + (7.42 \times 10^{11}) =$

4. $(6.42 \times 10^{3}) + (5.17 \times 10) =$

5. $(9.37 \times 10^{5}) - (6.21 \times 10^{3}) =$

SCORE __ / 5

Standard Form - Calculations

Activity 3

Answer the questions in standard form, using the information in the table

Planet	Mass (kg)
Mercury	3.30×10^{23}
Venus	4.87×10^{24}
Earth	5.97×10^{24}
Mars	6.42×10^{23}
Jupiter	1.90×10^{27}

1. Calculate the difference in mass between Jupiter and Venus

2. Multiply the mass of Earth by Mars

3. Divide the mass of Jupiter by Mercury

4. Find the total mass of the 5 planets

SCORE __ / 4

Standard Form - Calculations

Plenary - What have I learnt today?

Negative and Fractional Powers

Learning outcomes

1. Use negative integer indices to represent reciprocals

2. Use fractional indices to represent roots

3. Use fractional indices to represent powers and roots

Starter activity

Write as single powers

a) $6^2 \times 6^3 =$

b) $6^3 \times 6^4 =$

c) $6^7 \div 6^5 =$

d) $\frac{7^8}{7^2} =$

e) $\frac{5^4}{5^3} =$

f) $(7^4)^3 =$

g) $(3^2)^5 =$

h) $\frac{4^5}{4^3 \times 4^2} =$

i) $\frac{10^7}{10^8} =$

Negative and Fractional Powers

Activity 1

1. Write the following as fractions

a) 5^{-1} b) 3^{-2} c) 6^{-3}

d) 8^{-2} e) 2^{-4}

2. Write the following in the form a^{-n}

a) $\frac{1}{7} =$ b) $\frac{1}{11} =$ c) $\frac{1}{3^2} =$

d) $\frac{1}{25} =$ e) $\frac{3}{49} =$

3. Simplify the following

a) $\left(\frac{1}{2}\right)^{-1} =$ b) $\left(\frac{2}{3}\right)^{-1} =$

c) $\left(\frac{1}{3}\right)^{-2} =$ d) $\left(\frac{5}{2}\right)^{-3} =$

SCORE __ / 14

Activity 2

1. Evaluate

a) $81^{\frac{1}{2}} =$ b) $144^{\frac{1}{2}} =$ c) $1000^{\frac{1}{3}} =$ d) $8^{\frac{1}{3}} =$

(This activity continues on the next page)

Negative and Fractional Powers

Activity 2

2. a) Write 3 as a power of 9

b) Write 4 as a power of 64

3. Evaluate

a) $16^{-\frac{1}{2}} =$

b) $400^{-\frac{1}{2}} =$

c) $1000^{-\frac{1}{3}} =$

d) $216^{-\frac{1}{3}} =$

SCORE __ / 10

Activity 3

1. Evaluate

a) $9^{\frac{3}{2}} =$

b) $27^{\frac{2}{3}} =$

c) $125^{\frac{2}{3}} =$

d) $9^{\frac{5}{2}} =$

e) $1000^{\frac{2}{3}} =$

f) $169^{\frac{3}{2}} =$

g) $64^{\frac{2}{3}} =$

h) $343^{\frac{2}{3}} =$

(This activity continues on the next page)

Negative and Fractional Powers

Activity 3

2. Write the following as powers of 3

a) $9 =$

b) $27 =$

c) $\sqrt[3]{27} =$

d) $\left(\sqrt{9}\right)^3 =$

e) $\left(\sqrt[3]{27}\right)^2 =$

f) $\frac{1}{\sqrt{9}} =$

SCORE __ / 14

Plenary - What have I learnt today?

Surds

Learning outcomes

1. Understand what is a surd and why they are used

2. Simplify a surd

3. Multiply and simplify a surd

4. Divide and simplify a surd

Starter activity

Complete the calculations

1. a) $12^2 =$ b) $10^2 =$ c) $4^2 =$

d) $9^2 =$ e) $14^2 =$ f) $7^2 =$

Give the two answers to each calculation

2. a) $\sqrt{4} =$ b) $\sqrt{1} =$ c) $\sqrt{25} =$

d) $\sqrt{169} =$ e) $\sqrt{225} =$ f) $\sqrt{121} =$

Surds

Activity 1

Identify which of the following are surds. If they are not a surd explain why

a) $\sqrt{36}$ =

b) $\sqrt{100}$ =

c) $\sqrt{10}$ =

d) $\sqrt{3}$ =

e) $\sqrt{16}$ =

f) $\sqrt{15}$ =

g) $\sqrt{144}$

h) $\sqrt{49}$ =

i) $\sqrt{25}$ =

SCORE __ / 9

Activity 2

1. Find the value of k in each of these

a) $\sqrt{8} = k\sqrt{2}$ =

b) $\sqrt{300} = k\sqrt{3}$ =

c) $\sqrt{45} = k\sqrt{5}$ =

2. Simplify fully, write in the form $k\sqrt{m}$ where k and m are integers

a) $\sqrt{20}$ =

b) $\sqrt{32}$ =

c) $\sqrt{72}$ =

d) $\sqrt{162}$ =

e) $\sqrt{147}$ =

f) $\sqrt{288}$ =

(This activity continues on the next page)

Surds

Activity 2

3. The surds have been simplified. What was the original surd?

a) $3\sqrt{2}$ =

b) $5\sqrt{7}$ =

c) $4\sqrt{3}$ =

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Activity 3

1. Write as a single surd and simplify

a) $\sqrt{20} \times \sqrt{5}$ =

b) $\sqrt{16} \times \sqrt{4}$ =

c) $\sqrt{27} \times \sqrt{3}$ =

d) $\sqrt{24} \times \sqrt{6}$ =

e) $\sqrt{6} \times \sqrt{8} \times \sqrt{3}$ =

f) $\sqrt{10} \times \sqrt{5} \times \sqrt{2}$ =

2. Simplify

a) $2\sqrt{20} \times 3\sqrt{5}$ =

b) $7\sqrt{2} \times 4\sqrt{11}$ =

c) $3\sqrt{2} \times 2\sqrt{6} \times 2\sqrt{3}$ =

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Surds

Activity 4

1. Write as a single surd and then simplify

a) $\frac{\sqrt{50}}{\sqrt{2}} =$

b) $\frac{\sqrt{90}}{\sqrt{10}} =$

c) $\frac{\sqrt{320}}{\sqrt{5}} =$

d) $\frac{\sqrt{32} \times \sqrt{8}}{\sqrt{4}} =$

e) $\frac{\sqrt{35} \times \sqrt{5}}{\sqrt{7}} =$

f) $\frac{\sqrt{48} \times \sqrt{8}}{\sqrt{6}} =$

2. Simplify

a) $\frac{8\sqrt{75}}{\sqrt{5}} =$

b) $\frac{6\sqrt{160}}{3\sqrt{10}} =$

c) $\frac{4\sqrt{72} \times 3\sqrt{4}}{12\sqrt{2}} =$

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Plenary - What have I learnt today?

Calculating with Surds

Learning outcomes

1. Calculate with surds

2. Rationalise the denominator

3. Use surds in exact calculations, without a calculator

Starter activity

Simplify the expressions by collecting like terms

a) $3a + 5b - a - 2b =$

b) $8a + 5b + 7c - 3a - 2b - 6c =$

c) $10x + 3x + y - 5x + 8y =$

d) $x^2 + 4x + 3x^2 - 2x =$

e) $13a^2 + 5a - 7a^2 + 3a =$

e) $6xyz + 5yzx - 3zyx =$

Calculating with Surds

Activity 1

1. Add or subtract the surds

a) $5\sqrt{2} + 4\sqrt{2} =$ b) $3\sqrt{11} - 2\sqrt{11} =$ c) $4\sqrt{5} + 4\sqrt{5} =$

d) $4\sqrt{5} + \sqrt{5} =$ e) $5\sqrt{3} + 3\sqrt{3} =$ f) $3\sqrt{2} - 4\sqrt{2} =$

2. Simplify and then add or subtract the surds

a) $\sqrt{3} + \sqrt{12} =$ b) $\sqrt{27} + \sqrt{48} =$ c) $\sqrt{32} - \sqrt{2} =$

d) $5\sqrt{32} + \sqrt{50} =$ e) $4\sqrt{24} - 2\sqrt{6} =$ f) $3\sqrt{8} + 5\sqrt{12} =$

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Activity 2

Rationalise the denominators

a) $\frac{1}{\sqrt{7}} = \frac{1}{\sqrt{7}} x \frac{\sqrt{7}}{\sqrt{7}} =$ b) $\frac{1}{\sqrt{3}} =$ c) $\frac{1}{2\sqrt{3}} =$

(This activity continues on the next page)

Calculating with Surds

Activity 2

d) $\frac{5}{\sqrt{2}} =$

e) $\frac{3\sqrt{2}}{\sqrt{8}} =$

f) $\frac{5\sqrt{3}}{\sqrt{6}} =$

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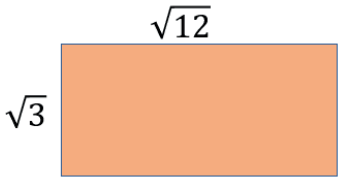
Activity 3

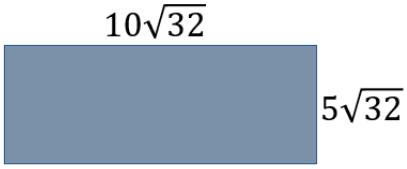
1. For each rectangle

a) calculate the area
b) calculate the perimeter

1.

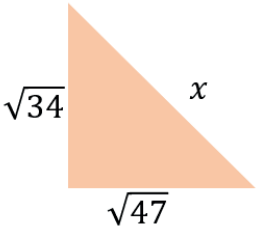


2.

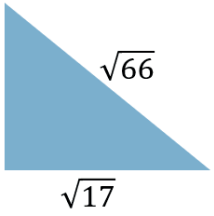


2. For each right angled triangle calculate the length of side x

1.



2.



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Calculating with Surds

Plenary - What have I learnt today?

Notes

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