

Algebraic Fractions: Starters

مفرد عامل سب سے بڑا مشترک عامل HCF (1 of 3) Starter 1: Prime Factors &

سادہ کرنا

1. Simplify $\sqrt{20}$.

2. Work out 2^{-1} and $9^{\frac{1}{2}}$.

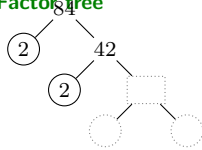
عامل درخت

3. Complete the factor tree. Write 84 as a

اس
مفرد عامل
حاصل ضرب
product
of prime factors
in index form.

عامل درخت

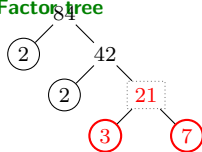
Factor tree



مفرد عامل سب سے بڑا مشترک عامل Starter 1: Prime Factors & HCF (1 of 3)

عامل درخت

Factor tree



سادہ کرنا

1. Simplify $\sqrt{20}$. $\sqrt{4 \times 5} = 2\sqrt{5}$
2. Work out 2^{-1} and $9^{\frac{1}{2}}$. $\frac{1}{2}$ and 3

عامل درخت

3. Complete the factor tree. Write 84 as a
اس مفرد عامل حاصل ضرب
 product of prime factors in index form.

$$84 = 2^2 \times 3 \times 7$$

Starter 1: Prime Factors & HCF (2 of 3)



4. $60 = 2^2 \times 3 \times 5$. Complete Venn diagram A for 60 and 84, then find the HCF and the LCM of 60 and 84.
- وین ڈایا گرام
- سب سے بڑا مشترک عامل
- سب سے چھوٹا مشترک مضاعف

5. Simplify $\frac{60}{84}$ by dividing by the

سب سے بڑا مشترک عامل

HCF

. Which numbers in

Starter 1: Prime Factors & HCF (2 of 3)



وین ڈایاگرام

4. $60 = 2^2 \times 3 \times 5$. Complete Venn diagram A for 60

and 84, then find the HCF and

the LCM of 60 and 84.

سب سے بڑا مشترک عامل

HCF = 12;

سب سے چھوٹا مشترک مضاعف

LCM

$$= 2^2 \times 3 \times 5 \times 7 = 420$$

سادہ کرنا

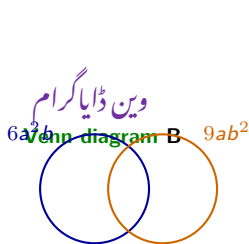
5. Simplify $\frac{60}{84}$ by dividing by the

سب سے بڑا مشترک عامل

HCF

. Which numbers in

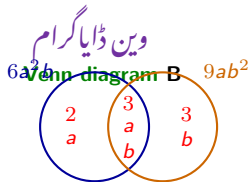
Starter 1: Prime Factors & HCF (3 of 3)



- سادہ کرنا
 6. Simplify $\frac{x^5}{x^2}$ by writing out the xs and cancelling.

- وین ڈیاگرام
 7. (Challenge) Complete Venn diagram B for $6a^2b$ and $9ab^2$. Use it to simplify $\frac{6a^2b}{9ab^2}$.

مفرد عامل Starter 1: Prime Factors & سب سے بڑا مشترک عامل HCF (3 of 3)



6. سادہ کرنا Simplify $\frac{x^5}{x^2}$ by writing out the xs and کینسل کرنا cancelling.

کینسل کرنا
 x^2 cancels from the top and the bottom,

leaving $x^3 = x^{5-2}$

7. (Challenge) Complete وین ڈیاگرام Venn diagram B for $6a^2b$

and $9ab^2$. Use it to سادہ کرنا simplify $\frac{6a^2b}{9ab^2}$. The

سب سے بڑا مشترک عامل
 HCF is $3ab$, so $\frac{6a^2b}{9ab^2} = \frac{2a}{3b}$

Starter 2: Index Laws (1 of 3)

1. Write 72 as a product of prime factors in index form.

سادہ کرنا

2. Simplify $\sqrt{8} + \sqrt{18}$.

سادہ کرنا

3. Simplify $x^4 \times x^3$ and $y^8 \div y^2$.

اس Starter 2: Index Laws (1 of 3) مفرد عامل حاصل ضرب اس

1. Write 72 as a product of prime factors in index form. $72 = 2^3 \times 3^2$

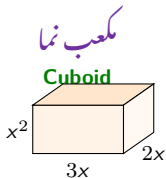
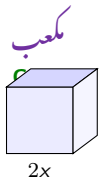
سادہ کرنا

2. Simplify $\sqrt{8} + \sqrt{18}$. $2\sqrt{2} + 3\sqrt{2} = 5\sqrt{2}$

سادہ کرنا

3. Simplify $x^4 \times x^3$ and $y^8 \div y^2$. x^7 and y^6

اس Starter 2: Index Laws (2 of 3)

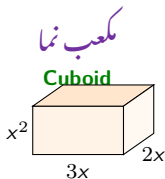
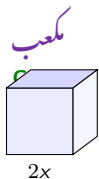


4. Write 2^{-3} and x^{-2} as ^{کسر}fractions.

5. Find the ^{جھم}volume of the ^{مکعب}cube. Is it $2x^3$ or $8x^3$?

6. Find the ^{جھم}volume of the ^{مکعب نما}cuboid.

اس Starter 2: Index Laws (2 of 3)



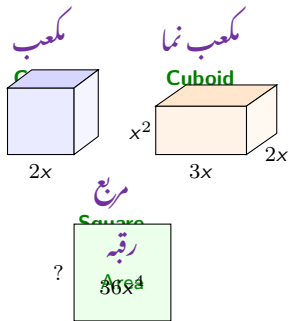
4. Write 2^{-3} and x^{-2} as fractions. $\frac{1}{8}$ and $\frac{1}{x^2}$
5. Find the volume of the cube. Is it $2x^3$ or $8x^3$?

$$(2x)^3 = 2^3 x^3 = 8x^3$$

6. Find the volume of the cuboid.

$$3x \times 2x \times x^2 = 6x^4$$

اس Starter 2: Index Laws (3 of 3)



7. The square has area $36x^4$, so its side length is

$(36x^4)^{\frac{1}{2}}$. Simplify this.

8. (Extension) Complete the working.

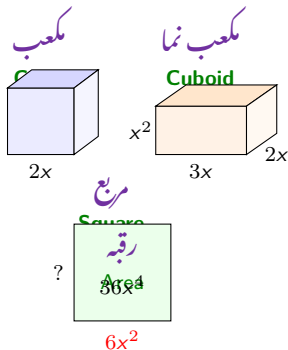
$$8^{-\frac{2}{3}} = \frac{1}{8^{\frac{2}{3}}} = \frac{1}{(\sqrt[3]{8})^2} = \frac{1}{\square^2} = \square$$

9. (Challenge) Divide the volume of the cube by the

volume of the cuboid. Write the answer as a

fraction in its simplest form.

اس Starter 2: Index Laws (3 of 3)



7. The square has area $36x^4$, so its side length is

($36x^4$) ^{$\frac{1}{2}$} . Simplify this. $36^{\frac{1}{2}} \times x^{4 \times \frac{1}{2}} = 6x^2$

8. (Extension) Complete the working.

$$8^{-\frac{2}{3}} = \frac{1}{8^{\frac{2}{3}}} = \frac{1}{(\sqrt[3]{8})^2} = \frac{1}{2^2} = \frac{1}{4}$$

9. (Challenge) Divide the volume of the cube by the

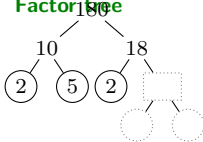
volume of the cuboid. Write the answer as a

fraction in its simplest form. $\frac{8x^3}{6x^4} = \frac{4}{3x}$

Starter 3: **Surds** & **Single Brackets** (1 of 3)

عامل درخت

Factor tree



سب سے بڑا مشترک عامل

1. Find the **HCF** of 18 and 24.

2. Work out $16^{\frac{1}{2}}$ and $16^{-\frac{1}{2}}$.

عامل درخت

3. Complete the **factor tree**. Write 180 as a

حاصل ضرب

مفرد عامل

اس

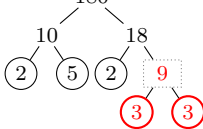
product

of **prime factors** in **index** form.

Starter 3: جزر اصم Surds & بریکٹ Single Brackets (1 of 3)

عامل درخت

Factor tree



سب سے بڑا مشترک عامل

1. Find the **HCF** of 18 and 24. **6**

2. Work out $16^{\frac{1}{2}}$ and $16^{-\frac{1}{2}}$. **4 and $\frac{1}{4}$**

عامل درخت

3. Complete the **factor tree**. Write 180 as a

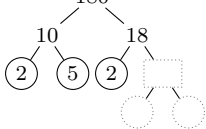
حاصل ضرب مفرد عامل اس
product of **prime factors** in **index** form.

$$180 = 2^2 \times 3^2 \times 5$$

Starter 3: جذر اصم Surds & بریکٹ Single Brackets (2 of 3)

عامل درخت

Factor tree

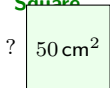


Rectangle A

$\sqrt{2}$ 3



مربع
Square



ساده کرنا مفرد عامل

4. Use the prime factors to simplify $\sqrt{180}$.

مربع رقبه

5. The square has area 50 cm^2 . Find its side length

جذر اصم احاطه

as a simplified surd, and its perimeter.

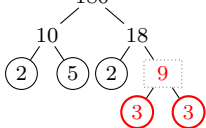
توسیع کرنا

6. Complete rectangle A to expand $\sqrt{2}(\sqrt{2} + 3)$.

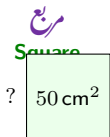
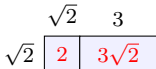
Starter 3: جذر اصم Surds & بریکٹ Single Brackets (2 of 3)

عامل درخت

Factor tree



Rectangle A



$5\sqrt{2}$ cm

ساده کرنا مفرد عامل

4. Use the **prime factors** to **simplify** $\sqrt{180}$.

$$\sqrt{2^2 \times 3^2 \times 5} = 2 \times 3 \times \sqrt{5} = 6\sqrt{5}$$

مربع رقبه

5. The **square** has **area** 50 cm². Find its side length

جذر اصم احاطه

as a simplified **surd**, and its **perimeter**.

$$\sqrt{50} = 5\sqrt{2} \text{ cm}; \quad 4 \times 5\sqrt{2} = 20\sqrt{2} \text{ cm}$$

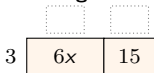
توسيع کرنا

6. Complete rectangle A to **expand** $\sqrt{2}(\sqrt{2} + 3)$.

$$2 + 3\sqrt{2}$$

Starter 3: ^{جذر اضم}Surds & ^{بریکٹ}Single Brackets (3 of 3)

Rectangle B



7. Complete rectangle B to ^{تجزیہ کرنا}factorise $6x + 15$. Then

^{سادہ کرنا}
^{simplify} $\frac{6x + 15}{3}$.

8. (Challenge) Sam says $\frac{6 + \sqrt{18}}{3} = 2 + \sqrt{18}$.

^{سادہ کرنا}

Explain Sam's mistake, then ^{simplify} it correctly.

Starter 3: ^{جزر اصم} Surds & ^{بریکٹ} Single Brackets (3 of 3)

Rectangle B

	2x	5
3	6x	15

7. Complete rectangle B to ^{تجزیہ کرنا} factorise $6x + 15$. Then

^{سادہ کرنا} simplify $\frac{6x + 15}{3}$. $3(2x + 5)$; $2x + 5$, not

$2x + 15$

8. (Challenge) Sam says $\frac{6 + \sqrt{18}}{3} = 2 + \sqrt{18}$.

^{سادہ کرنا}

Explain Sam's mistake, then ^{سادہ کرنا} simplify it correctly.

^{رکن}

Divide both ^{رکن} terms by 3: $2 + \frac{3\sqrt{2}}{3} = 2 + \sqrt{2}$

Starter 4: Double Brackets (1 of 3)

Grid A

	x	5
x	x^2	
2		

1. Is 3^{-2} equal to -9 , -6 or $\frac{1}{9}$?

سادہ کرنا

2. Simplify $\sqrt{50} - \sqrt{8}$. Is it $\sqrt{42}$?

توسیع کرنا

3. Complete grid A to expand $(x + 2)(x + 5)$.

Starter 4: Double Brackets (1 of 3)

Grid A

	x	5
x	x^2	$5x$
2	$2x$	10

1. Is 3^{-2} equal to -9 , -6 or $\frac{1}{9}$? $\frac{1}{3^2} = \frac{1}{9}$

سادہ کرنا

2. Simplify $\sqrt{50} - \sqrt{8}$. Is it $\sqrt{42}$? No:

$$5\sqrt{2} - 2\sqrt{2} = 3\sqrt{2}$$

توسیع کرنا

3. Complete grid A to expand $(x + 2)(x + 5)$.

$$x^2 + 7x + 10$$

Starter 4: Double Brackets (2 of 3)

Grid B

		x	
x	x^2		
		12	

رقبہ

$$\text{Area} = x^2 + 7x + 12$$

4. Write 12 as a **product** of **prime factors**, then list its **factor pairs**. Which pair adds to 7?

5. Complete grid B to **factorise** $x^2 + 7x + 12$.

6. A rectangle has **area** $x^2 + 7x + 12$ and width $x + 3$. Find its length. Use this to **simplify**

$$\frac{x^2 + 7x + 12}{x + 3}.$$

Starter 4: Double Brackets (2 of 3)

Grid B

		x	4
x	x^2	$4x$	
3	$3x$	12	

رقبہ

$$\text{Area} = x^2 + 7x + 12$$

4. Write 12 as a **product** of **prime factors**, then
عوامل کا جوڑا

list its **factor pairs**. Which pair adds to 7?

$$2^2 \times 3; \quad 1 \times 12, 2 \times 6, 3 \times 4; \quad 3 + 4 = 7$$

تجزیہ کرنا

5. Complete grid B to **factorise** $x^2 + 7x + 12$.

$$(x + 3)(x + 4), \text{ in either order}$$

رقبہ

6. A rectangle has **area** $x^2 + 7x + 12$ and width

سادہ کرنا

$x + 3$. Find its length. Use this to **simplify**

$$\frac{x^2 + 7x + 12}{x + 3} \cdot \frac{(x + 3)(x + 4)}{x + 3} = x + 4$$

Starter 4: Double Brackets (3 of 3)

تجزیہ کرنا

بریکٹ

دو مربعوں کا فرق

توسیع کرنا

7. Factorise $x^2 - 9$. Use the difference of two squares to expand $(3 + \sqrt{2})(3 - \sqrt{2})$.

حاصل ضرب

8. (Challenge) $391 = 20^2 - 3^2$. Use this to write 391 as a product of

مفرد عامل

prime factors.

Starter 4: Double Brackets (3 of 3)

تجزیہ کرنا

بریکٹ

دو مربعوں کا فرق

توسیع کرنا

7. Factorise $x^2 - 9$. Use the difference of two squares to expand $(3 + \sqrt{2})(3 - \sqrt{2})$.

$$(x + 3)(x - 3); \quad 9 - 2 = 7$$

8. (Challenge) $391 = 20^2 - 3^2$. Use this to write 391 as a product of

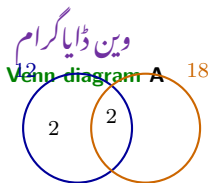
حاصل ضرب

مفرد عامل

مفرد عدد

prime factors. $(20 + 3)(20 - 3) = 23 \times 17$, both prime

Starter 5: $\frac{\text{سب سے چھوٹا مشترک مضاعف}}{\text{LCM}}$ & $\frac{\text{کسر}}{\text{Fractions}}$ (1 of 3)



سادہ کرنا

1. Simplify $a^3 \times a^{-1}$.

2. Work out $\sqrt{8} \times \sqrt{2}$.

3. $12 = 2^2 \times 3$ and $18 = 2 \times 3^2$. Complete

وین ڈیاگرام

Venn diagram A, then find the

سب سے بڑا مشترک عامل

HCF

and the

سب سے چھوٹا مشترک مضاعف

LCM

of 12 and 18.

Starter 5: $\frac{\text{سب سے چھوٹا مشترک مضاعف}}{\text{LCM}}$ & $\frac{\text{کسر}}{\text{Fractions}}$ (1 of 3)

سادہ کرنا

1. Simplify $a^3 \times a^{-1}$. $a^{3+(-1)} = a^2$

2. Work out $\sqrt{8} \times \sqrt{2}$. $\sqrt{16} = 4$

3. $12 = 2^2 \times 3$ and $18 = 2 \times 3^2$. Complete



وین ڈایاگرام

Venn diagram A, then find the

سب سے بڑا مشترک عامل

HCF

and the

سب سے چھوٹا مشترک مضاعف

LCM

of 12 and 18.

سب سے بڑا مشترک عامل

HCF

$= 6$;

سب سے چھوٹا مشترک مضاعف

LCM

$= 2^2 \times 3^2 = 36$

سب سے چھوٹا مشترک مضاعف

Starter 5:

LCM

کسر & Fractions (2 of 3)

4. Complete: $\frac{5}{12} + \frac{7}{18} = \frac{\boxed{}}{36} + \frac{\boxed{}}{36} = \frac{\boxed{}}{36}$

5. Write $\frac{x}{12} - \frac{x}{18}$ as a single **fraction**.

6. Work out $\frac{3}{4} \times \frac{8}{9}$. Then **simplify** $\frac{3x}{4} \div \frac{9x}{10}$.

سادہ کرنا

سب سے چھوٹا مشترک مضاعف

Starter 5:

LCM

کسر & Fractions (2 of 3)

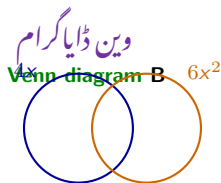
4. Complete: $\frac{5}{12} + \frac{7}{18} = \frac{15}{36} + \frac{14}{36} = \frac{29}{36}$

5. Write $\frac{x}{12} - \frac{x}{18}$ as a single fraction. $\frac{3x}{36} - \frac{2x}{36} = \frac{x}{36}$

6. Work out $\frac{3}{4} \times \frac{8}{9}$. Then simplify $\frac{3x}{4} \div \frac{9x}{10}$. $\frac{24}{36} = \frac{2}{3}$; $\frac{3x}{4} \times \frac{10}{9x} = \frac{30x}{36x} = \frac{5}{6}$

Starter 5: $\frac{\text{سب سے چھوٹا مشترک مضاعف}}{\text{LCM}}$ & $\frac{\text{کسر}}{\text{Fractions}}$ (3 of 3)

7. $4x = 2 \times 2 \times x$ and $6x^2 = 2 \times 3 \times x \times x$.



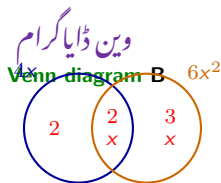
وین ڈیاگرام

Complete Venn diagram B, then find the $\frac{\text{سب سے چھوٹا مشترک مضاعف}}{\text{LCM}}$ of $4x$ and $6x^2$.

8. (Challenge) Write $\frac{5}{4x} + \frac{1}{6x^2}$ as a single $\frac{\text{کسر}}{\text{fraction}}$.

Starter 5: $\frac{\text{سب سے چھوٹا مشترک مضاعف}}{\text{LCM}}$ & $\frac{\text{کسر}}{\text{Fractions}}$ (3 of 3)

7. $4x = 2 \times 2 \times x$ and $6x^2 = 2 \times 3 \times x \times x$.



Complete Venn diagram B, then find the $\frac{\text{سب سے چھوٹا مشترک مضاعف}}{\text{LCM}}$ of $4x$ and $6x^2$.

$$2 \times 2 \times 3 \times x \times x = 12x^2$$

8. (Challenge) Write $\frac{5}{4x} + \frac{1}{6x^2}$ as a single $\frac{\text{کسر}}{\text{fraction}}$.

$$\frac{15x}{12x^2} + \frac{2}{12x^2} = \frac{15x + 2}{12x^2}$$