

Year 8 Term 1 Math Homework

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| Student Name: _____ | Grade: _____ |
| Date: _____ | Score: _____ |

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5 Year 8 Term 1 Week 5 Homework

5.1 Topic 1 — Algebra

5.1.1 Factorising: The Highest Common Factor

To factorise an algebraic expression:

- write the HCF of the terms outside grouping symbols
- divide each term in the expression by the HCF to find the terms inside the grouping symbols.
- $ab + ac = a(b + c)$ $ab - ac = a(b - c)$

Example 5.1.1 Factorise the following:

- $6x + 18$
 $= (6 \times x) + (6 \times 3) = 6(x + 3)$
- $2c^2 - 6c$
 $= (2c \times c) - (2c \times 3)$
 $= 2c(c - 3)$
- $12u^2 + 8uv$
 $= (4u \times 3u) + (4u \times 2v)$
 $= 4u(3u + 2v)$

Exercise 5.1.1 Factorise the following algebraic expressions:

- $-15a^2 + 35ab =$ _____
- $2u + 2v - 12 =$ _____
- $6x - 9y + 24z =$ _____
- $18x^2y - 24xyz =$ _____
- $a^2b + ab^2 + 2ab =$ _____
- $-12q^2p + 9qp^2 =$ _____
- $12wxy - 20x^2 + 8xy^2 =$ _____
- $35ab^2 - 40a^2b^2 + 15b =$ _____

Example 5.1.2 Factorise by taking out the binomial common factor or HCF

1. $2a(b - c) + (b - c) = (2a + 1)(b - c)$

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

Exercise 5.1.2 Factorise by taking out the binomial common factor

1. $a(b + c) + 3(b + c) =$ _____

2. $a(a + 4) + (a + 4) =$ _____

3. $2x(y - 2) - 2(y - 2) =$ _____

4. $2c(c + d) - (c + d) =$ _____

5. $(a - 3) - a(a - 3) =$ _____

6. $u(v + 12) + 2v(v + 12) =$ _____

7. $5m(n - 5) - 5n(n - 5) =$ _____

8. $(k + m) - n(k + m) =$ _____

Exercise 5.1.3 Factorise by taking out HCF

1. $a^4 - a^5 =$ _____

2. $b^6 + 2b^3 =$ _____

3. $4x^6 - 8x^4 =$ _____

4. $8m^4 - 14m^3n =$ _____

5. $5u^8 + 3u^6 =$ _____

6. $2x^2y - 6xy^4 + 8x^2y^2 =$ _____

7. $12a^6b^4 + 8a^4b^2 - 16a^3b^5 =$ _____

8. $3x^2y^3z^4 + x^3y^4z^5 - 9x^6y^5z^4 =$ _____

5.1.2 Adding and Subtracting Algebraic Fractions

To add or subtract algebraic fractions:

1. Express the fractions with a common denominator
2. Add or subtract the numerators and simplify if possible.

Example 5.1.3 Simplify the following

$$1. \frac{5x}{12} - \frac{7x}{12} = -\frac{2x}{12} = -\frac{x}{6}$$

$$2. \frac{2a}{3} + \frac{a}{4} = \frac{8a}{12} + \frac{3a}{12} = \frac{11a}{12}$$

$$3. \frac{17p}{20} - \frac{p}{4} = \frac{17p}{20} - \frac{5p}{20} \\ = \frac{12p}{20} \\ = \frac{3p}{5}$$

Exercise 5.1.4 Simplify the following algebraic fractions:

$$1. \frac{13t}{15} - \frac{8t}{15} = \underline{\hspace{10cm}}$$

$$2. \frac{11m}{12} - \frac{3m}{12} = \underline{\hspace{10cm}}$$

$$3. \frac{3w}{4} + \frac{4w}{5}$$

$\underline{\hspace{10cm}}$

$\underline{\hspace{10cm}}$

$$4. \frac{4x}{3} - \frac{11x}{15}$$

$\underline{\hspace{10cm}}$

$\underline{\hspace{10cm}}$

$$5. \frac{5y}{12} - \frac{7y}{24}$$

$\underline{\hspace{10cm}}$

$\underline{\hspace{10cm}}$

Exercise 5.1.5 Further Applications

1. $\frac{a+2}{2} + \frac{a+3}{4}$

2. $\frac{m-2}{3} + \frac{m+2}{4}$

3. $\frac{x+3}{5} + \frac{x-1}{7}$

4. $\frac{2x+2}{5} - \frac{x-5}{2}$

5. $\frac{5y-2}{4} + \frac{2y-3}{7}$

6. $\frac{n-2}{6} + \frac{n+3}{3}$

7. $\frac{b+3}{8} - \frac{b-3}{3}$

8. $\frac{2s-3}{3t} + \frac{3s+1}{t}$

5.1.3 Multiplying Algebra Fractions**To multiply algebraic fractions:**

1. Cancel any common factors between the numerators and denominators
2. Multiply the numerators and multiply denominators.

Example 5.1.4 Simplify:

1. $\frac{a}{4} \times \frac{b}{7} = \frac{ab}{28}$

2. $\frac{4x}{15} \times \frac{3y}{8} = \frac{xy}{10}$

3. $\frac{3a^2}{4b^2} \times \frac{2b}{9a} = \frac{a}{6b}$

Exercise 5.1.6 Simplify the following algebraic fractions:

1. $\frac{ab}{4} \times \frac{2a}{b} =$ _____

2. $\frac{4x}{5} \times \frac{15y}{8} =$ _____

3. $\frac{2}{d} \times \frac{3}{8d} =$ _____

4. $\frac{7w}{3x} \times \frac{4w}{5y} =$ _____

5. $\frac{y}{4} \times \frac{k}{6} =$ _____

6. $\frac{a}{b} \times \frac{c}{ad} =$ _____

7. $\frac{3e}{4f} \times \frac{5g}{6h} =$ _____

8. $\frac{3a}{4b} \times \frac{3ab}{4cd} =$ _____

5.1.4 Dividing Algebra Fractions**To divide algebraic fractions:**

- Take the reciprocal of the fraction that is written after the division sign
- Change the division sign to multiplication
- Multiply the fractions

Example 5.1.5 Simplify:

1. $\frac{x}{3} \div \frac{y}{9} = \frac{x}{3} \times \frac{9}{y} = \frac{3x}{y}$

2. $\frac{2m}{5} \div \frac{3}{7n} = \frac{2m}{5} \times \frac{7n}{3} = \frac{14mn}{15}$

3. $\frac{pq}{45r} \div \frac{qr}{35} = \frac{pq}{45r} \times \frac{35}{qr} = \frac{7p}{9r^2}$

Exercise 5.1.7 Simplify the following algebraic fractions:

1. $\frac{m}{4} \div \frac{6}{n} =$ _____

2. $\frac{x}{4} \div \frac{y}{6} =$ _____

3. $\frac{e}{f} \div \frac{5}{6} =$ _____

4. $\frac{3x}{4y} \div \frac{5y}{6z} =$ _____

5. $\frac{3m}{5} \div \frac{3}{25n} =$ _____

6. $\frac{15b}{d} \div \frac{25b}{12d} =$ _____

7. $\frac{vw}{27} \div \frac{uv}{36} =$ _____

8. $\frac{x}{yz} \div \frac{xy}{z} =$ _____

5.2 Topic 2 — Pythagoras' Theorem

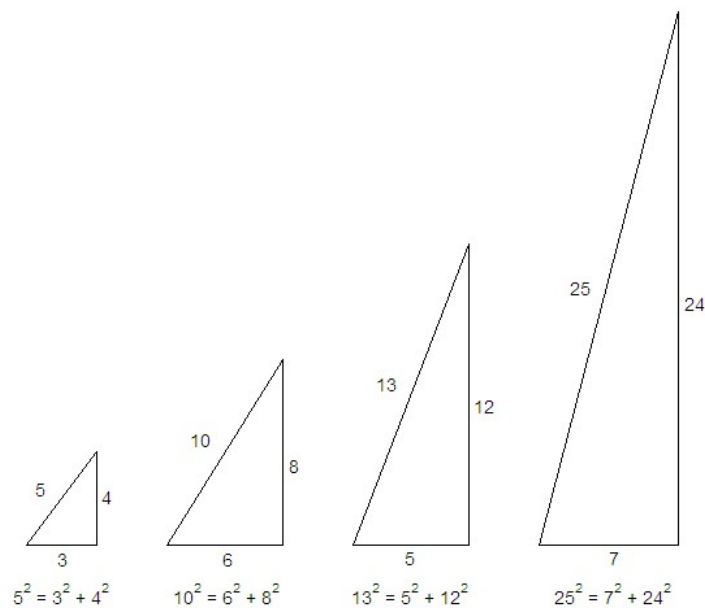
5.2.1 Using Pythagoras' Theorem to Prove a Triangle is Right Angled

Exercise 5.2.1 Are the following triangles right-angled?

1. 24 cm, 32 cm and 40 cm = _____
2. 10 cm, 14 cm and 17 cm = _____
3. 15 cm, 15 cm and 30 cm = _____
4. 25.8 cm, 34.4 cm and 43 cm = _____

5.2.2 Pythagorean Triads (or Triples)

There are few famous Pythagorean Triads which only involve whole numbers. These should be remembered because they often occur in the exam questions.



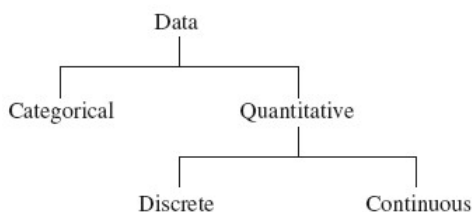
Exercise 5.2.2 Which two of these are Pythagorean triads?

1. 5, 12, 14 _____
2. 6, 8, 11 _____
3. 14, 48, 50 _____
4. 30, 40, 50 _____

5.3 Topic 3 — Data Representation

5.3.1 Classifying Data

Variables are particular characteristics of people or objects. Variables can be classified as either categorical or quantitative:



1. A categorical variable is a variable that describes a category of group of things. It can not be counted or measured.
2. A quantitative variable is a variable that has an numerical value.
 - A discrete variable is a quantitative variable that has an exact value and usually arises after counting has occurred (number of marbles in a box).
 - A continuous variable is a quantitative variable that can assume any value between certain limit and usually arises after measuring has occurred (height, weight and speed).

Example 5.3.1 Classify the following data as either categorical, discrete quantitative or continuous quantitative.

1. *number of students in a classroom — discrete quantitative data*
2. *skin colour — categorical data*
3. *the weight of a human — continuous quantitative data*

Exercise 5.3.1 Classify the following data as either categorical, discrete quantitative or continuous quantitative.

1. *ice-cream flavours* _____
2. *age of a man* _____
3. *the area of a play ground* _____
4. *TV station* _____
5. *litres of petrol in a car* _____
6. *level of noise* _____

5.4 Topic 4 — Miscellaneous Exercises

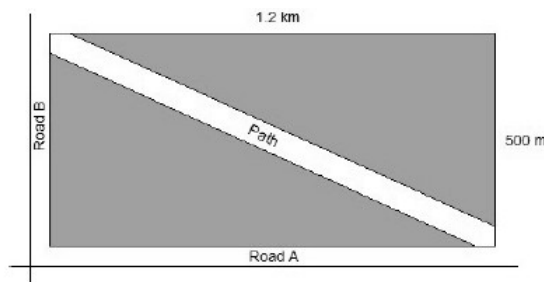
Exercise 5.4.1

1. The diagonals of a rhombus are 10 cm and 24 cm. What is the length of the side of the rhombus?

2. A triangular prism has a volume of 480 cm^3 . The cross section of the prism is an isosceles triangle with base of 6 cm. The depth of the prism is 20 cm. Find the length of the longest side of the triangular cross section. (Answer correct to 2 d.p.)

3. If the rate of inflation is 2.25% p.a., what will a car be priced at \$25,200 this year be priced at in 12 months time?

4. A rectangle park measures 1.2 km and 500 m. It has roads on two of its sides. A path leads from one corner of the park to the opposite corner.



(a) How much distance is saved by taking the path rather than walking around the park?

(b) If David walks 50 m every minute, how much time will he save by taking the path?

Exercise 5.4.2 Simplify the following algebraic fractions:

1. $\frac{2d-3}{12} + \frac{d+1}{4} =$ _____

2. $\frac{m}{6} \times \frac{2}{x} =$ _____

3. $\frac{3x^2}{2a} \times \frac{8a^3}{5xy} =$ _____

4. $\frac{6x^2}{5y} \div \frac{3x}{10y^3} =$ _____

Exercise 5.4.3 Find the discounted price of the following items:

1. DVD recorder \$499, discount $5\frac{3}{4}\%$ _____

2. Play station 2 \$869, discount $8\frac{1}{2}\%$ _____

3. A new car \$24490, discount $4\frac{1}{4}\%$ _____

Exercise 5.4.4 Classify the following data as either categorical, discrete quantitative or continuous quantitative.

1. Distance between 2 cities _____

2. Time taken to walk 2 km _____

3. Speed of a race car _____

4. Flavours of potato chips _____

5. Girl's name beginning with V _____

6. Temperature at the South Pole _____

7. Electricity usage in your house in one year _____

8. Number of teachers in a school _____

Exercise 5.4.5 Expand the following binomial products:

1. $(3x - 7)(2x + 5) =$ _____

2. $(2m - 5)^2 =$ _____

3. $5(6 - 4x)(6 + 4x) =$ _____

5.5 Topic Test (Percentage)

1. Convert the percentage to a fraction in its simplest form. [5]

$$28\frac{2}{3}\% = \underline{\hspace{15em}}$$

2. Convert the percentage to a decimal. [5]

$$0.0125\% = \underline{\hspace{15em}}$$

3. Convert the decimal to percentage. [5]

$$0.0125 = \underline{\hspace{15em}}$$

4. Insert $>$, $<$ or $=$ into the box to make a true statement. $0.018 \square 18\%$. [5]

5. Tony scored 75% on one of his topic test, which was marked out 120. What was Tony's exam mark? [5]

6. A group of 6000 people were surveyed to determine their favourite style of music. Of these, 15.4% favoured Classical, 28.5% favoured Rock'n roll, 34.8% favoured Pop and the rest favoured 'Other styles of music'. How many people favoured 'Other styles of music'? [5]

7. What percentage is 36000 m of 12 km? = _____ [5]

8. What percentage of 72 ha is 16.2 ha? = _____ [5]

9. A box of fruit contains 24 apples, 14 oranges, 8 pears and 2 mangoes. Find the percentage composition of the fruit box. [5]

10. Raymond scored 75% on Part A of his Maths exam, which was marked out of 120 and 85% on Part B, which was marked out of 80. What was his overall percentage for this exam? [5]

11. Find the retail price of a \$75 MP3 player if a 12% discount is given. [5]

12. A bicycle was bought for \$180 and sold 3 years later for \$45. By what percentage has the value decreased? [5]

13. In a box of light bulbs, 4% are faulty, If there are 14 faulty bulbs, what is the total number of bulbs in the box? [5]

14. After a pay rise of 5.5%, Peter's weekly pay is \$915.74. What was his weekly pay before the pay rise? [5]

15. Last week a car salesman earned \$895, which included a weekly retainer of \$250 plus a 2% commission on his sales. Calculated the value of his sales for that week. [5]

16. A LCD TV was sold for \$1750, making a profit of 40% on the cost price. What was the cost price of the LCD TV? [5]

17. A car dealer buys a second hand car for \$4000 and sells it 2 weeks later for \$5400. What is his percentage profit? [5]

18. Interest of \$50.64 was earned in 3 months on a balance of \$3376. What is the interest rate per annum earned on the account? [5]

19. After an 8% wage increase a man's salary is \$56786.40. What was his wage before the increase? [5]

20. A car depreciates in value by 15% for the first year and for each later year by 12% of its value at the beginning of that year. Calculate the percentage decrease in the value of the car after 3 years. [5]
