

Year 8 Term 1 Math Homework

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

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4 Year 8 Term 1 Week 4 Homework

4.1 Topic 1 — Percentages

4.1.1 Simple Interest

- Find the interest accrued after 1 year.
- Multiply this answer by the number of years the money has been invested.
- $I = \frac{P \times R \times N}{100}$ where:
I = Interest, P = Principle invested, R = Rate of interest and N = Number of years

Example 4.1.1 Find the simple interest if \$3000 is invested in a saving account at 8% p.a. for 6 years.

Solution: $\text{Interest per year} = \$3000 \times 8\%$
 $= 3000 \times 0.08$
 $= \$240$
 $\therefore \text{Interest for 6 years} = 6 \times \$240 = \$1440$

Exercise 4.1.1

1. Find the simple interest if \$5000 is invested in a saving account at $13\frac{1}{2}\%$ for 5 years.

2. Find the simple interest if \$3600 is invested in saving account at 12.8% for 8 months.

3. I borrowed \$250,000 at 6% p.a. interest. What will be my monthly interest repayments?

4. I can invest money at an interest rate of $5\frac{3}{4}\%$ p.a. How much should I invest now to ensure that I have \$5000 after 1 year? (give your answer to the nearest \$100)

4.1.2 Chapter Review (Percentages)**Exercise 4.1.2**

1. Convert each percentage to a fraction in its simplest form:

(a) $93\% =$ _____

(b) $65\% =$ _____

(c) $5\frac{1}{4}\% =$ _____

(d) $86\frac{1}{2}\% =$ _____

2. Convert each percentage to either a mixed numeral or an integer:

(a) $244\% =$ _____

(b) $1500\% =$ _____

(c) $152.5\% =$ _____

(d) $100.25\% =$ _____

3. Convert each percentage to a decimal:

(a) $64\% =$ _____

(b) $264\% =$ _____

(c) $13.2\% =$ _____

(d) $37.25\% =$ _____

4. Convert each fraction or mixed numeral to a percentage:

(a) $\frac{9}{25} =$ _____

(b) $2\frac{1}{8} =$ _____

(c) $8\frac{5}{6} =$ _____

(d) $\frac{5}{12} =$ _____

5. Convert each decimal to a percentage:

(a) $0.08 =$ _____

(b) $1.025 =$ _____

(c) $0.15 =$ _____

(d) $12.02 =$ _____

Exercise 4.1.3

1. Evaluate the following:

(a) 25% of \$240 = _____

(b) 105% of 250 mL = _____

(c) 25.8% of 25 kg = _____

(d) $66\frac{2}{3}\%$ of 360 kg = _____

2. What percentage:

(a) is \$4 of \$24? = _____

(b) is 12 g of 25 g? = _____

(c) of 28 cm is 21 cm? = _____

(d) of 8 km is 240 m? = _____

3. Increase:

(a) \$950 by 6% = _____

(b) 45 m by 120% = _____

(c) 36 kg by $33\frac{1}{3}\%$ = _____

(d) \$125 by 125% = _____

4. Decrease:

(a) 680 kg by 12% = _____

(b) \$850 by 6.2% = _____

(c) \$168 by 12.5% = _____

(d) 120 L by 52% = _____

5. Find the number if:

(a) 6% of the number is 36 = _____

(b) 15% of the number is 288 = _____

(c) 120% of the number is 72 = _____

(d) 0.83% of the number is 581 = _____

Exercise 4.1.4 Problem solving

1. Crystal scored 84% in a maths topic test. How many questions did she get wrong if there were 50 questions altogether?

2. Find the weekly pay, if \$85 retainer plus 6% commission on a sale of \$6450 was paid to a salesman.

3. Increase \$2500 by 12% and then decrease the result by 12%.

4. After an 8% wage increase a man's salary is \$32,940. What was his wage before the increase?

5. A TV was purchased for \$2800 and later sold for \$2450. Find the percentage loss.

6. A worker with an annual salary of \$45,500 received a 5% pay rise.

(a) Calculate his new annual salary.

(b) How much extra will he receive each fortnight?

7. Alice gave 80% of her salary to her parents. She spent 10% of it and saved the remaining \$2400. How much did she give to her parents?

Exercise 4.1.5 Further percentages

1. *Kathy savings is 10% more than Carol's. If Kathy transfers \$280 into Carol's saving account, Carol's savings will be 10% more than Kathy's. Find their total savings.*

2. *Ray's monthly salary was \$2380 last year. This year, his salary increased by 5%. How much will he earn this year?*

3. *The length of a rectangle is 120% that of its breadth. The perimeter of the rectangle is 88 cm. Find the area of the rectangle.*

4. *The population is increasing at $\frac{1}{2}\%$ p.a.in a certain city. If it is 20,500,000 now, how large was it a year ago? (give your answer in a whole number)*

5. *A car depreciates in value by 12% for the first year and for the each later year by 10% of its value at the beginning of that year. Calculate the percentage decrease in the value of the car after 5 years.*

4.2 Topic 2 — Algebra

4.2.1 The Distributive Law

To expand an expression containing grouping symbols:

- Multiply each term inside by the term outside.
- $a(b + c) = ab + ac$ and $a(b - c) = ab - ac$

Example 4.2.1 Expand and simplify:

Solution: $5a(3a + 8) + 2a^2 = 15a^2 + 40a + 2a^2 = 17a^2 + 40a$

Exercise 4.2.1 Expand and simplify each of these expressions:

1. $p(q - 5) + 4pq =$ _____

2. $3d(2d^2 - 5d) + 3d^2 =$ _____

3. $12 + 3(y - 4) + 6y =$ _____

4. $3(a + 4) + 5(a - 3) =$ _____

5. $a^2(5a^3 - 6a + 3) =$ _____

6. $x^3y^2(x^2y^3 - xy^2) =$ _____

7. $2a^2b^3(4cd^3 - 8b^2d) =$ _____

8. $2y^5(6y^4 - y^3) =$ _____

9. $6n^2 + 3n(6 - 11n) + 9n =$ _____

10. $4p(10p - 7) + 2(3p^2 + 6p) =$ _____

Exercise 4.2.2 A chicken has a mass of $6p$ kg. A puppy is 5 kg heavier than the chicken. The mass of a dog is twice the total mass of the chicken and the puppy.

1. Find the total mass of these 3 animals in terms of p .

2. If $p = 1.5$, find the average mass of the 3 animals.

4.2.2 The Distributive Law and Directed Numbers

$$-a(b + c) = -ab - ac \quad \text{and} \quad -a(b - c) = -ab + ac$$

Example 4.2.2 Expand and simplify

$$\begin{aligned} & 6(2x - 5) - 3(4x - 8) \\ &= 12x - 30 - 12x + 24 \\ &= -6 \end{aligned}$$

Exercise 4.2.3 Expand and simplify each of these expressions:

- $5(a + 3) - 2(a - 2) =$ _____
- $7(y - 5) - 3(y - 2) =$ _____
- $5p + 20q - 4(2p - 6q) =$ _____
- $2(x + 5) + 3(x - 5) - 4(x + 3) =$ _____
- $6(n + 4) - 2(n - 3) - 3(5 - n) =$ _____
- $3x(2x - 4) - 2(2x - 4) =$ _____

Exercise 4.2.4 Problem Solving

- Harry is 12 years old. His father is x years older than he. What will be their total age in $4x$ years' time?*

- A group of 12 people have $\$p$ between them. A thirteenth person joins them and brings with him $\$50$. What is the average wealth of each person?*

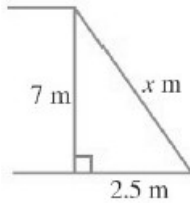
- An exam is taken by ' p ' boys and ' q ' girls. The boys score an average of ' m ' and the girls score an average of ' n '. Find the average for the whole exam.*

4.3 Topic 3 — Pythagoras' Theorem

4.3.1 Solving Problems by Using Pythagoras's Theorem

Example 4.3.1 The foot of a ladder is 2.5 m away from the base of a wall. If the ladder reaches 7 m up the wall, what is the length of the ladder?

Solution:



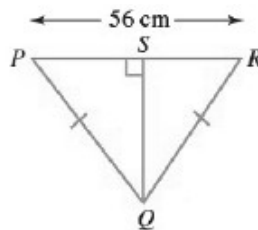
$$x^2 = 7^2 + 2.5^2 = 49 + 6.25 = 55.25$$

$$\therefore x = \sqrt{55.25} \text{ (in surd form)}$$

$$x = 7.4 \text{ (correct to 1 decimal place)}$$

$$\therefore \text{The length of the ladder is } 7.4 \text{ m}$$

Exercise 4.3.1 PQR is an isosceles triangle with a perimeter of 162 cm and a base of 56 cm.



1. Find the length of QR.

2. Find the area of the triangle.

4.4 Miscellaneous Exercises

Exercise 4.4.1 Expand and simplify:

1. $4ab(2a + b^2) + 6b(a^2 - 3b) =$ _____

2. $3a(4a - 2b) - 2b(4a - 5b) =$ _____

3. $(2x + 4)(3x + 6) =$ _____

4. $5(4a - 3)(3a + 4) =$ _____

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

Exercise 4.4.2 Consolidation

1. A rectangle is three times as long as its broad. If it is x cm long, find its perimeter and area in terms of x .

2. A car travels at s km/h for 12 km, then increases its speed by 4 km/h and travels for a further 6 km. How long did the car travel? (Give your answer in terms of s)

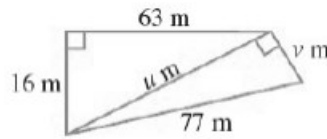
3. A car bought for $\$p$ was sold at a profit of 15%. What was the selling price?

4. Interest of $\$69$ was earned in 4 months on a balance of $\$3450$. What is the interest rate per annum earned on the account?

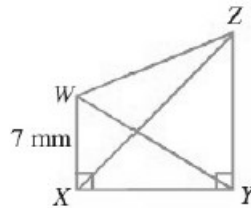
5. I borrowed $\$380,000$ at 6.5% p.a. interest. What will be my monthly interest repayments?

Exercise 4.4.3 Further Applications

1. For the figure shown below find value of u and v , correct to 1 decimal place where necessary.



2. If $WY = 25 \text{ mm}$ and $XZ = 26 \text{ mm}$.



(a) Find the length of XY and YZ .

(b) Find the area of the trapezium $WXYZ$.

3. A ladder of length 12 m reaches 9 m up the side of a wall. How far is the foot of the ladder from the base of the wall. (give your answer to one decimal place)

Exercise 4.4.4 Challenging Problems

1. The cost of 1 kg of apples is 80% of the cost of 1 kg of oranges. If 1 kg of oranges cost 38 cents more than the 1 kg of apples, how much will 3 kg of apples and 5 kg of oranges cost?

2. Alice and Emma went shopping with a total of \$122. After Alice spent $\frac{1}{4}$ of her money and Emma spent \$18, the ratio of Alice's money and Emma's money became 1:3. What was the ratio of Alice's money to Emma's money at first?

3. $ABCDEF$ is a regular hexagon of area 6 cm^2 . G is the reflection of E in DF . What is the area of the hexagon $ABCDGF$ (in cm^2)

