

TABLE OF CONTENTS

Practices

Expressions and equations

1	Exponents	5
2	Square roots	9
3	Solve two-step equations	13
4	Two-step equations with rational numbers	17

Review 1	Practices 1 and 2	21
-----------------	-------------------	----

Review 2	Practices 3 and 4	23
-----------------	-------------------	----

5	Linear and nonlinear equations	25
6	Gradient	29
7	Graph linear equations	33
8	Solve sets of simultaneous equations graphically	37

Review 3	Practices 5 and 6	41
-----------------	-------------------	----

Review 4	Practices 7 and 8	43
-----------------	-------------------	----

9	Solve sets of simultaneous equations algebraically	45
----------	--	----

Plane geometry

10	Special pairs of angles	49
11	Angle sums	53
12	Triangle similarity	57

Review 5	Practice 9	61
-----------------	------------	----

Review 6	Practices 10–12	63
-----------------	-----------------	----

Linear measurement and area

13	Pythagorean theorem	65
14	Distance formula	69

Statistics

15	Mean, median, range	73
-----------	---------------------	----

Graphs

16	Scatter plots	77
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Review 7	Practices 13 and 14	81
Review 8	Practices 15 and 16	83

Glossary		85
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EXPONENTS

Let's solve this together.



Use the rules of exponents to solve the problem.

1. Why do you subtract exponents to divide c^9 by c^5 ?

Expand the expression $\frac{c^9}{c^5}$ to see why exponents are subtracted in division.

The base, _____, is the factor that is multiplied by itself. The _____ is the number of times the base is used as a factor.

Rules for working with exponents:

- Add the **exponents** when *multiplying powers* with the same base:
 $a^3 \times a^4 = a^{3+4} = a^7$
- Subtract the exponents when *dividing* powers with the same base:
 $\frac{a^5}{a^3} = a^2$
- Multiply exponents when a power is *raised to an exponent*: $(a^2)^3 = a^6$.

$$\frac{c^9}{c^5} = \frac{\square \times \square \times \square \times \square \times \square \times \square \times \square \times \square \times \square}{\square \times \square \times \square \times \square \times \square}$$

Expand the numerator and denominator.

$$= \frac{\square \times \square \times \square \times \square \times \square}{\square \times \square \times \square \times \square \times \square} \times \square \times \square \times \square \times \square$$

Make pairs of like terms.

$$= \square \times \square \times \square \times \square \times \square \times \square \times \square \times \square \times \square$$

Simplify each pair.

$$= \square \times \square \times \square \times \square$$

Multiply.

$$= \square^{\square}$$

Use an exponent to write the multiplication.

Solution: Because you are removing pairs of like terms that simplify to _____, you subtract exponents when dividing powers that have the same _____.

Solve each problem. Fill in the blanks.

2. Find the value of $\frac{3^9}{3^7}$.
- $$\frac{3^9}{3^7} = 3^{9-\square} = 3^{\square} = \underline{\hspace{2cm}}$$
- Solution:** _____

3. Simplify the expression $a^3 \times a^2$.
- $$a^3 \times a^2 = a^{3+\square} = a^{\square}$$
- Solution:** _____

4. Use what you know to find the value of $4 \times 10^3 \times 3 \times 10^2$.
- $$4 \times 10^3 \times 3 \times 10^2 = 4 \times 3 \times 10^3 \times 10^2$$
- $$= \underline{\hspace{2cm}} \times 10^{\square}$$
- $$= \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$
- $$= \underline{\hspace{2cm}}$$

Solution: _____

5. Simplify the expression $(b^3)^4$.
- Solution:** _____

Solve each problem. Choose the best answer.

6. Which shows a pair of expressions that are equivalent?

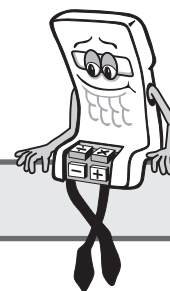
- Ⓐ $(a^4)^5$ and a^9
- Ⓑ $b^3 \times b^4 - b^3$ and b^4
- Ⓒ $(c^4 \times c^2)^2$ and c^{12}
- Ⓓ $d^3 \times d \times d$ and $d^3 + 2d$

7. Which shows a pair of expressions that are equivalent?

- Ⓐ $\frac{(a^3)^2}{a}$ and a^5
- Ⓑ $b^3 \times b^5 \div b^3$ and b^{12}
- Ⓒ $\frac{c^4}{c^6} \times c^2$ and c^6
- Ⓓ $\frac{d^6}{d^3} \times d^2$ and d

8. Simplify $(2a)^2$.

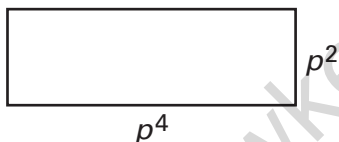
- Ⓐ $2a^2$
- Ⓑ $2a^3$
- Ⓒ $4a$
- Ⓓ $4a^2$



REASONING

Solve each problem.

9. What is the area of the rectangle? Show your work.



Solution: The area of the rectangle is _____ units.

10. Can you simplify $\frac{a^6}{b^2}$? If so, simplify. If not, explain why not.

EXPONENTS

Let's solve this together.



Use what you know about factors to solve the problem.

1. To factorise the expression, first factorise each term.

$$b^2 + 6b \qquad b^2 = b \times b \qquad 6b = 6 \times b$$

Each term has the factor b .

Use the Distributive Property to factorise out the common factor, _____.

Solution: $b^2 + 6b =$ _____

Solve the problem. Fill in the blanks.

2. Factorise the expression $3m^4 + 6m^2$.

Factorise each term.

$$3m^4 = \text{_____} \times \text{_____} \times \text{_____} \times \text{_____} \times \text{_____}$$

$$6m^2 = 2 \times \text{_____} \times \text{_____} \times \text{_____}$$

Find the highest common factor by multiplying the factors found in both terms:

$$\text{_____} \times \text{_____} \times \text{_____} = \text{_____}$$

Use the Distributive Property to factorise:

$$\begin{aligned} 3m^4 + 6m^2 &= 3m^2 \times \text{_____} + 3m^2 \times \text{_____} \\ &= 3m^2 (\text{_____} + \text{_____}) \end{aligned}$$

Solution: $3m^4 + 6m^2 =$ _____

Solve each problem. Choose the best answer.

3. Which is a common factor in all three terms of the expression $g^4 + 3g^2 + 6g$?

- (A) g
- (B) $3g$
- (C) g^2
- (D) $3g^2$

4. Which is a common factor in all three terms of the expression $2a^3 + 8a^2 + 6a$?

- (A) $2a$
- (B) $4a$
- (C) $2a^3$
- (D) $3a^2$

Solve each problem. Show your work.

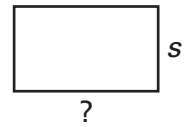
5. Factorise $3p^3 + 12p^2$.

Solution: $= 3p^3 + 12p^2 =$ _____

6. Factorise $10b^5 + 15b^3 + 5b$.

Solution: $= 10b^5 + 15b^3 + 5b =$ _____

7. The area of the rectangle is $A = s^2 + 7s$. What is the width of the rectangle?

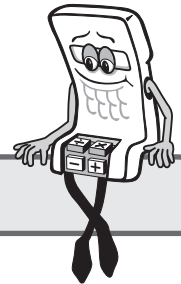


Solution: The width of the rectangle is _____ units.

Solve the problem. Choose the best answer.

8. Which expression is equivalent to $2(w + 1)$?

- (A) $2w + 1$ (C) $w + 2$
 (B) $2w + 2$ (D) $(w + 1)(w + 1)$



REASONING

Use this information for numbers 9 and 10. Solve each problem.

The surface of Earth is 5×10^8 square kilometres. The area of Australia is 7.6×10^6 square kilometres.

9. What is the highest common factor between the surface of Earth and the area of Australia? _____
10. About how many times larger is the surface of Earth compared to the area of Australia?
- _____

REVIEW 1: PRACTICES 1 AND 2

Solve each problem. Choose the best answer.

1. Which shows an expression that is equivalent to $\sqrt{9} \times \sqrt{64}$?

- (A) $\sqrt{16} \times \sqrt{81}$ (C) $\sqrt{36}$
(B) 6^2 (D) 3×2^3

2. Which is a common factor to all three terms in the expression $4h^3 + 6h^2 + 2h$?

- (A) 2 (C) $2h^2$
(B) $2h$ (D) $3h$

3. Which shows a pair of expressions that are equivalent?

- (A) $\frac{m^7}{m^6}$ and m
(B) $\frac{m^{10} \times m^6}{m^{15}}$ and m^4
(C) $m^3 \times m^7$ and m^{21}
(D) $(m^4)^2$ and $m^2 \times m^4$

Solve each problem. Explain your answer.

4. How are the expressions $(x^3)^3$ and $x^3 \times x^3$ the same? How are they different?

5. Without simplifying, can you tell if the given expressions are equivalent?

$(a \times a \times a) \times (a \times a \times a)$ and $(a \times a \times a) + (a \times a \times a)$

Solve each problem. Write the solution.

6. Jason said the value of $\sqrt{60}$ is about 8. Carla said the value of $\sqrt{60}$ is closer to 7.5. Are both answers reasonable? Explain your answer.

7. Factorise $2a^4 + 4a^3 + 8a^2 + 6a^3$.

Before factorising, see if you can combine like terms.

Solution: $2a^4 + 4a^3 + 8a^2 + 6a^3 =$ _____.

8. Factorise $\frac{c^4 + 2c^3}{c^2}$. First factorise the numerator using the Distributive Property. Then simplify the expression using the rules of exponents.

Solution: $\frac{c^4 + 2c^3}{c^2} =$ _____

REASONING

Use this information for numbers 9 and 10. Solve each problem. Explain your thinking.

Olivia has an outdoor platform that has an area of 6 square metres.

9. She wants a tarpaulin that will cover the platform and hang down about 50 centimetres on all sides. Estimate the length of each side of the tarpaulin. Show your work.

10. She has a square tarpaulin that has an area of 9 square metres. Will it cover the table? Will it hang down 50 centimetres on each side? Draw a sketch to help you see how many square metres are on each side.
