UNIT TEST #010 | Australian Curriculum Mathematics | UTM8T1U2

# Expanding, and Factorising

# 8 Unit Test

ACACIA TUTORING

**Free and always will be!**

**Instructions:** Read all questions carefully to ensure you understand what is being asked. When completing your official tests / exams, your grade will be based upon your: **understanding, fluency, reasoning, and problem solving,** so ensure you show all lines of working and draw accurate, labelled diagrams where necessary. (ACiQ|9.0 Mathematics standard elaborations found on final page (general assessment marking standards)). [Practise tests are marked out of a score of 10]. For multiple choice questions, tick or fill in the circle next to the corresponding letter under the question.

Check your work if you have time. *Remember:* you don't have to start at question one, it's always best to firstly look through the test, highlight the easy looking questions and complete them first, then secondly, go back through and work on the harder questions. Good luck! And remember to breathe!

$$\sum = \frac{\quad}{10} = \quad \%$$

## Part 1: Multiple Choice (2 marks)

### Question 1:

**a) Expand** $2(x+6)$ **.**

**A.** $2x+26$ **B.** $x+12$ **C.** $2x+8$ **D.** $2x+12$

◯ **A** ◯ **B** ◯ **C** ◯ **D**

Working out space for 1a…

**b) Factorise** $8a^2 + 12a$ **.**

**A.** $4a(2a + 3)$ **B.** $4a(4a + 8)$ **C.** $a(4a + 6)$ **D.** $4a(2a + 4)$

◯ **A** ◯ **B** ◯ **C** ◯ **D**

Working out space for 1b…

## Question 2:

**a) Expand** $(y - 1)(y + 5)$ **.**

**A.** $-y^2 + 4y - 5$ **B.** $y^2 - 4y - 5$ **C.** $y^2 + 4y - 5$ **D.** $y^2 - y - 5$

◯ **A** ◯ **B** ◯ **C** ◯ **D**

Working out space for 2a…

**b) Factorise** $x^2 + 7x + 12$ **.**

**A.** $(x + 6)(x + 6)$ **B.** $(x + 3)(x + 4)$ **C.** $(x + 7)(x + 12)$ **D.** $(x + 6)(x + 7)$

◯ **A** ◯ **B** ◯ **C** ◯ **D**

Working out space for 2b…

## Part 2: Short Answer (4 marks)

### Question 3:

**a) Factorise** $8a^2 + 12a + 4a$ **.**

**b) Factorise** $x^2 - 5x - 6$ **.**

## Question 4:

**a) Expand and simplify:** $4(a - 3) + 2(a + 1)$ **.**

**b) Expand and simplify:** $(3y - 1)(y + 4)$ **.**

## Part 3: Problem Solving (4 marks)

### Question 5:

**a) Factorise:** $-a^2 - 2a + 24$ **.**

**b) If the area of a rectangle is given by $x^2 - 36$ square units, what could be the dimensions of the rectangle?**

## Question 6:

**a) If the area of a rectangle is given by $x^2 + 5x + 6$ square units, what could be the dimensions of the rectangle?**

**b) Factorise:** $6a^2 - 13a + 6$ **.**

## Solutions

**1. (0.5 marks)**

D. $2x + 12$

Using the distributive property:

$a(b + c) = ab + ac$

$2(x + 6)$

$= 2 \times x + 2 \times 6$

$= 2x + 12$

**b. (0.5 marks)**

A. $4a(2a + 3)$

The common factor is 4a:

$\rightarrow 8a^2 + 12a$

$= 4a \cdot 2a + 4a \cdot 3$

$= 4a \cdot (2a + 3)$

$= 4a(2a + 3)$ .

**2a. (0.5 marks)** *(Use Crab Claw)*

**C.** $y^2 + 4y - 5$

$(y - 1)(y + 5) = y \cdot y + y \cdot 5 - 1 \cdot +y - 1 \cdot +5$

( − × + = − ) If signs are:
opposite → change to −
same → change to +

$= y^2 + 5y - y - 5$

Combine like terms:

$= y^2 + 4y - 5$ .

**b. (0.5 marks)**

**B.** $(x + 3)(x + 4)$

Look for two numbers that multiply to $12$ (the constant term) and add to $7$ (the coefficient of $x$):
Numbers are $3$ and $4$ , so:

$x^2 + 7x + 12$

$\_ \times \_ = 12 \ and \ \_ + \_ = 7$

$\rightarrow 3 \times 4 = 12 \ and \ 3 + 4 = 7$

$= (x + 3)(x + 4)$ .

**OR**

$x^2 + 7x + 12$

$\_ \times \_ = +12 \ and \ \_ + \_ = +7$

$\rightarrow 3 \times 4 = +12 \ and \ 3 + 4 = +7$

$= (x + 3)(x + 4)$

$= (x + 3)(x + 4)$ .

**3a. (1 mark)**

Firstly, collect like terms:

$$8a^2 + 12a + 4a = 8a^2 + 16a$$

The common factor is $4a$ ,

$$\begin{aligned} 8a^2 + 16a &= 4a \cdot 2a + 4a \cdot 4 \\ &= 4a \cdot (2a + 4) \\ &= 4a(2a + 4)\,. \end{aligned}$$

**b. (1 mark)**

Find pairs of numbers that multiply to $-6$ and add to $-5$ :
Numbers are $+1$ and $-6$, so:

$$x^2 - 5x - 6$$

$$\_ \times \_ = -6 \ and \ \_ + \_ = -5$$
$$\rightarrow +1 \times -6 = -6 \ and \ +1 + -6 = -5$$
$$= (x + 1)(x - 6)\,.$$

**OR**

$$x^2 - 5x - 6$$

$$\_ \times \_ = -6 \ and \ \_ + \_ = -5$$
$$\rightarrow +1 \times -6 = -6 \ and \ +1 + -6 = -5$$
$$= (x + 1)(x - 6)$$
$$= (x + 1)(x - 6)\,.$$

**4a. (1 mark)**

$$4(a - 3) + 2(a + 1)$$

Apply the distributive property to each bracket:

$$4(a - 3) = 4a - 12$$
$$2(a + 1) = 2a + 2$$

Combine:

$$\begin{aligned} &4a - 12 + 2a + 2 \\ &= 6a - 10\,. \end{aligned}$$

**b. (1 mark)**

FOIL again:

$$(3y - 1)(y + 4)$$

$$\begin{aligned} &= 3y \cdot y + 3y \cdot 4 + (-1) \cdot y + (-1) \cdot 4 \\ &= 3y^2 + 12y - y - 4 \\ &= 3y^2 + 11y - 4\,. \end{aligned}$$

Remember, mathematicians sometimes use the symbol ( $\cdot$ ) instead of ( $\times$ ) so we don't get ( $\times$ ) confused with ( $x$ )
E.g. $2 \times x \equiv 2 \cdot x$

**5a. (1 mark)**

Firstly, move the negative one away from the $a^2$ term:

$$-a^2 - 2a + 24$$
$$= -1 \times a^2 - 2a + 24$$
$$= -1 \times a^2 - 1 \times +2a - 1 \times -24$$
$$= -1 \times (a^2 + 2a - 24)$$

Then, we factorise inside the brackets and apply the $-1\times$ at the end:

Factorise : $a^2 + 2a - 24$

We need numbers that multiply to give $(-24)$ and add to give $(+2)$ :

$\rightarrow \_ \times \_ = -24$ & $\_ + \_ = 2$ ?

$\rightarrow 6 \times -4 = -24$ & $6 + -4 = 2$

So numbers are $(+6)$ and $(-4)$

$$\rightarrow a^2 + 2a - 24$$
$$= (a + 6)(a - 4)$$

So,

$$-1 \times (a^2 + 2a - 24) = -(a^2 + 2a - 24)$$
$$= -(a + 6)(a - 4)\,.$$

**b. (1 mark)**

Area $= x^2 - 36$

$$x^2 - 36 = x^2 - 6^2$$
$$= (x - 6)(x + 6)\,.$$

Difference of two squares:

$$x^2 - a^2$$
$$= (x - a)(x + a)\,.$$

So factorising gives:

Area $= (x - 6) \times (x + 6)$

$=$ Length $\times$ Width , which means the dimensions could be:

$\rightarrow (x - 6)$ units by $(x + 6)$ units.

**6a. (1 mark)**

Area $= x^2 + 5x + 6$

$$\_ \times \_ = 6 \ and \ \_ + \_ = 5$$
$$\rightarrow 3 \times 2 = 6 \ and \ 3 + 2 = 5$$
$$= (x + 3)(x + 2)\,.$$

So factorising gives:

Area $= (x + 3) \times (x + 2)$

$=$ Length $\times$ Width , which means the dimensions could be:

$\rightarrow (x + 3)$ units by $(x + 2)$ units.

**b. (1 mark)**

$$6a^2 - 13a + 6$$

We need numbers that multiply to give $(6 \times 6) = 36$ and add to $-13$ :

These numbers are $-9$ and $-4$ ,

so we break $-13a$ into $-9a - 4a$ ,

$$\begin{aligned}
\text{Thus, } & 6a^2 - 13a + 6 \\
&= 6a^2 - 9a - 4a + 6 \\
&= 6a \times a - 9a - 4a + 6 \\
&= 2 \times 3a \times a - 3 \times 3a - 2 \times 2a + 2 \times 3 \\
&= 2 \times 3a \times a - 3 \times 3a - 2 \times 2a - 2 \times -3 \\
&= 2 \times a \times 3a - 3 \times 3a - 2 \times 2a - 2 \times -3 \\
&= 2a \times 3a - 3 \times 3a - 2 \times 2a - 2 \times -3 \\
&= 3a(2a - 3) - 2(2a - 3) \\
&= 3a(2a - 3) - 2(2a - 3) \\
&= (3a - 2)(2a - 3)
\end{aligned}$$

$$\sum = \frac{\quad}{10} = \quad \%$$

# General Assessment Marking Standards

**Remember:** When your official tests are marked, they won't be a score out of 10, they will be a grade (A,B,C,D,E) based on the following standards:

ACiQ | v9.0

## Year 8 Mathematics standard elaborations

| | | A | B | C | D | E |
|---|---|---|---|---|---|---|
| | | **The folio of student work contains evidence of the following:** | | | | |
| Mathematical proficiencies | Understanding | accurate and consistent identification, representation, description and connection of mathematical concepts and relationships in complex unfamiliar, complex familiar, and simple familiar situations | accurate identification, representation, description and connection of mathematical concepts and relationships in complex familiar and simple familiar situations | identification, representation, description and connection of mathematical concepts and relationships in simple familiar situations | partial identification, representation and description of mathematical concepts and relationships in some simple familiar situations | fragmented identification, representation and description of mathematical concepts and relationships in isolated and obvious situations |
| | Fluency | choice, use and application of comprehensive facts, definitions, and procedures to find solutions in complex unfamiliar, complex familiar, and simple familiar situations | choice, use and application of effective facts, definitions, and procedures to find solutions in complex familiar and simple familiar situations | choice, use and application of facts, definitions, and procedures to find solutions in simple familiar situations | choice and use of partial facts, definitions, and procedures to find solutions in some simple familiar situations | choice and use of fragmented facts, definitions and procedures to find solutions in isolated and obvious situations |
| | Reasoning | comprehensive explanation of mathematical thinking, strategies used, and conclusions reached in complex unfamiliar, complex familiar, and simple familiar situations | detailed explanation of mathematical thinking, strategies used, and conclusions reached in complex familiar and simple familiar situations | explanation of mathematical thinking, strategies used, and conclusions reached in simple familiar situations | partial explanation of mathematical thinking, strategies used, and conclusions reached in some simple familiar situations | fragmented explanation of mathematical thinking, strategies used, and conclusions reached in isolated and obvious situations |
| | Problem-solving | purposeful use of problem-solving approaches to find solutions to problems. | effective use of problem-solving approaches to find solutions to problems. | use of problem-solving approaches to find solutions to problems. | partial use of problem-solving approaches to make progress towards finding solutions to problems. | fragmented use of problem-solving approaches to make progress towards finding solutions to problems. |

**Key** shading emphasises the qualities that discriminate between the A–E descriptors

IMPORTANT: At Acacia Tutoring we believe all educational resources should be free, as education, is a fundamental human right and a cornerstone of an equitable society. By removing financial barriers, we ensure that all students, regardless of their socioeconomic background, have equal access to high-quality learning materials. This inclusivity promotes fairness, helps bridge achievement gaps, and fosters a society where every individual can reach their full potential.

Furthermore, free resources empower teachers and parents, providing them with tools to support diverse learners and improve outcomes across communities. Education benefits everyone, and making resources universally accessible ensures we build a more informed, skilled, and prosperous future for all.

All documents are formatted as a **.pdf** file, and are completely **FREE** to use, print and distribute - as long as they are not sold or reproduced to make a profit.

PER REVERENTIA INTEGRITAS
SCIENTIA ET MISERICORDIA
Through Respect Integrity
Knowledge and Compassion

N.B. Although we try our best to produce high-quality, accurate and precise materials, we at Acacia Tutoring are still human, these documents may contain errors or omissions, if you find any and wish to help, please contact Jason at info@acaciatutoring.com.au .