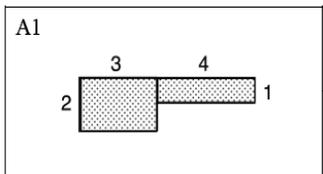


Use the expressions on the next page to match the area drawings below. Write the correct expression(s) and E\_ for each area drawing. There will be more than one expression for a drawing and you may need to write your own expression for a drawing.

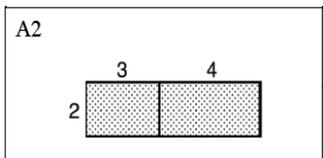
## STATION 1




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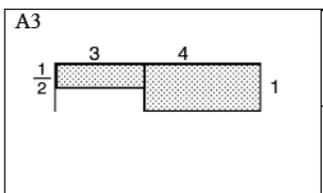
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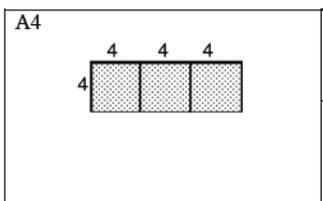
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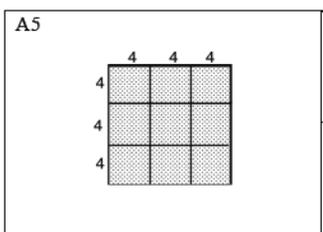
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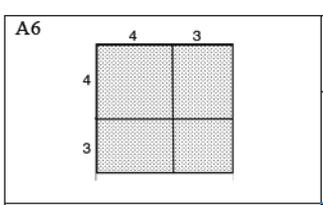
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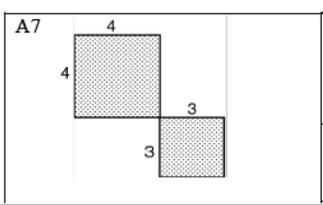
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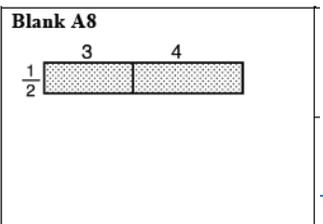
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Write the expression and E\_ beside the correct area drawing on the previous page. There will be more than one expression for a drawing and you may need to write your own expression for a drawing. Work with your group, take turns and justify each response.

## STATION 1

E1 $3^2 + 4^2$	E2 $2 \times 3 + 2 \times 4$
E3 $4 \times 3 \times 4$	E4 $3 \times 4^2$
E5 $(3 \times 4)^2$	E6 $\frac{3}{2} + \frac{4}{2}$
E7 $2 \times 3 + 4$	E8 $4 + 3 \times 2$
E9 $(3 + 4)^2$	E10 $4 + 3 \times \frac{1}{2}$
E11 $\frac{1}{2} \times (3 + 4)$	E12 $3^2 + 4^2 + 2 \times 3 \times 4$
E13 $\frac{3 + 4}{2}$	E14 $\frac{3}{2} + 4$
E15 $4 \times 4 + 3 \times 3$	E16

Use the words the next page to match the tables below. Write the correct words and W\_ for beside each table. There may be more than one word for a table or you may need to write your own word for a table.

## STATION 2

T1

<i>n</i>	1	2	3	4
<i>Ans</i>	14	16	18	20

T3

<i>n</i>	1	2	3	4
<i>Ans</i>		10	15	22

T5

<i>n</i>	1	2	3	4
<i>Ans</i>			81	100

T7

<i>n</i>	1	2	3	4
<i>Ans</i>		4		5

T2

<i>n</i>	1	2	3	4
<i>Ans</i>			81	144

T4

<i>n</i>	1	2	3	4
<i>Ans</i>	3		27	48

T6

<i>n</i>	1	2	3	4
<i>Ans</i>		10	12	14

T8

<i>n</i>	1	2	3	4
<i>Ans</i>	6.5	7	7.5	8

## STATION 2

Write the word and  $W\_$  beside the correct table on the previous page.

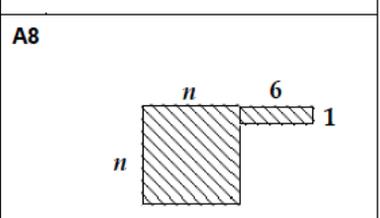
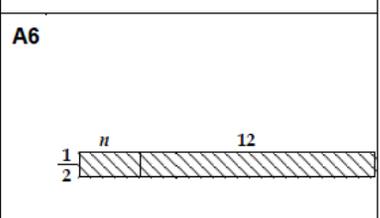
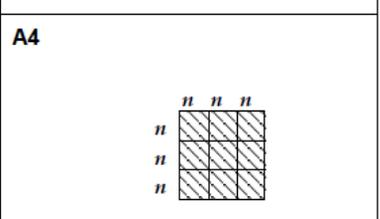
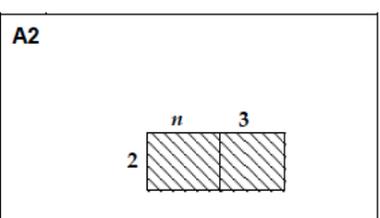
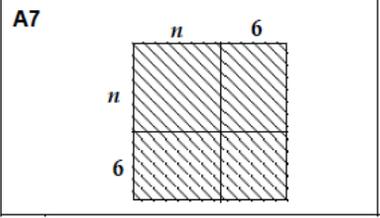
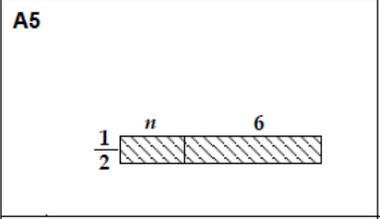
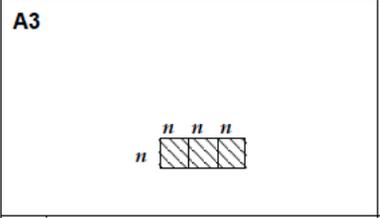
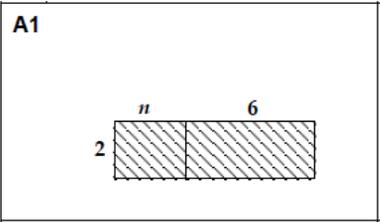
There may be more than one set of words for a table or you may need to write your own words for a table.

Work with your group, take turns and justify each response.

<b>W1</b> Multiply $n$ by two, then add six.	<b>W2</b> Multiply $n$ by three, then square the answer.
<b>W3</b> Add six to $n$ then multiply by two.	<b>W4</b> Add six to $n$ then divide by two.
<b>W5</b> Add three to $n$ then multiply by two.	<b>W6</b> Add six to $n$ then square the answer.
<b>W7</b> Multiply $n$ by two then add twelve.	<b>W8</b> Divide $n$ by two then add six.
<b>W9</b> Square $n$ , then add six	<b>W10</b> Square $n$ , then multiply by nine

Use the expressions on the next page to match the area drawings below. Write the correct expression(s) and E\_ for each area drawing. There may be more than one expression for a drawing or you may need to write your own expression for a drawing.

### STATION 3



## STATION 3

Write the expression and E\_ beside the correct area drawing on the previous page. There may be more than one expression for a drawing or you may need to write your own expression for the drawing.

Work with your group, take turns and justify each response.

E1 $\frac{n+6}{2}$	E2 $3n^2$
E3 $2n+12$	E4 $2n+6$
E5 $2(n+3)$	E6 $\frac{n}{2}+6$
E7 $(3n)^2$	E8 $(n+6)^2$
E9 $n^2+12n+36$	E10 $3+\frac{n}{2}$
E11 $n^2+6$	E12 $n^2+6^2$

## Teacher Led station, review the pre-assessment Expressions and Areas

Common issues	Suggested questions and prompts
<p><b>Does not find the areas of the rectangles</b></p>	<ul style="list-style-type: none"> <li>How do you calculate the area of a rectangle?</li> </ul>
<p><b>Does not recognize the function of parentheses</b>            For example: The student selects <math>2 \times 3 + 5</math> and/or <math>3 + 5 \times 2</math> as an appropriate expression (Q1a).            Or: The student selects <math>5 + 3 \times 5 + 3</math> as an appropriate expression (Q1b).</p>	<ul style="list-style-type: none"> <li>Does this expression describe the area of both rectangles in the compound area diagram?</li> <li>Which operation would you do first in the expression <math>3 + 5 \times 2</math>? How do you know? Work it out using a calculator. Is the answer what you expected?</li> <li>What does <math>()</math> mean?</li> <li>Can you write this expression without parentheses: <math>(3 + 5) \times 2</math>?</li> </ul>
<p><b>Does not understand the distributive law of multiplication (or division)</b>            For example: The student believes that <math>10 \times (4 + 5)</math> and <math>10 \times 4 + 5</math> are equivalent (Q2a)</p>	<ul style="list-style-type: none"> <li>Try typing these into a calculator. What happens in each case? Can you explain this?</li> <li>Try drawing an area diagram for each expression. What is the same and what is different?</li> </ul>
<p><b>Fails to recognize the commutative property</b>            For example: Student does not select <math>5 \times 5 + 2 \times 5 \times 3 + 3 \times 3</math> as a correct expression (Q1b) and does not recognize <math>5 \times 3</math> and <math>3 \times 5</math> as equivalent.</p>	<ul style="list-style-type: none"> <li>Can you write an expression for each of the four sections in the compound area diagram?</li> <li>Do any of the sections have the same area? How do you know? How could you check?</li> </ul>
<p><b>Does not see the link between multiplication and addition</b>            For example: The student does not select <math>3 + 5 + 3 + 5</math> as an appropriate expression (Q1a).</p>	<ul style="list-style-type: none"> <li>Can you draw an area diagram for <math>1 \times (3 + 5)</math>?</li> <li>What expression would describe this area diagram in the simplest way possible?</li> <li>If you put two of these diagrams together, what would the expression for the area be?</li> </ul>
<p><b>Assumes that squaring a number is the same as multiplying by two</b>            For example: The student states that <math>8^2 + 2^2</math> is the same as <math>(8 + 2)^2</math> (Q2b) and that both are equal to 20.</p>	<ul style="list-style-type: none"> <li>What is the difference between <math>8^2</math> and <math>8 \times 2</math>?</li> <li>Can you write these more succinctly:  <math>8 + 8 + 8</math> and <math>8 \times 8 \times 8</math>?</li> </ul>
<p><b>Does not understand the significance of the fraction 'bar'</b>            For example: The student is unable to explain the difference between <math>\frac{8+6}{2}</math> and <math>8 + 6 \div 2</math>.</p>	<ul style="list-style-type: none"> <li>How would you say <math>\frac{8+6}{2}</math> in words?</li> <li>What is the difference between <math>\frac{8+6}{2}</math> and <math>8 + \frac{6}{2}</math> and <math>\frac{8}{2} + 6</math>?            What is divided by two in each expression?</li> </ul>
<p><b>Completes the task</b>            The student needs an extension task.</p>	<ul style="list-style-type: none"> <li>Can you draw area diagrams to represent the expressions in question 2?</li> <li>Can you draw two different area diagrams that represent <math>4^2 - 2^2</math>?</li> </ul>

## STATION 4

Teacher Led station, review the pre-assessment Interpreting Expressions

### Common issues:

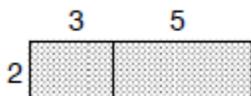
### Suggested questions and prompts:

<p>Student writes expressions left to right, showing little understanding of the order of operations implied by the symbolic representation.</p> <p>For example:</p> <p>Q1a Writes <math>n \times 5 + 4</math> (not incorrect).</p> <p>Q1b Writes <math>4 + n \times 5</math>.</p> <p>Q1c Writes <math>4 + n \div 5</math>.</p> <p>Q1d Writes <math>n \times n \times 3</math>.</p>	<ul style="list-style-type: none"> <li>Can you write answers to the following?  <math>4 + 1 \times 5</math>  <math>4 + 2 \times 5</math>  <math>4 + 3 \times 5</math></li> <li>Check your answers with your calculator. How is your calculator working these out?</li> <li>So what does <math>4 + n \times 5</math> mean? Is this the same as Q1b?</li> </ul>
<p>Student does not construct parentheses correctly or expands them incorrectly.</p> <p>For example:</p> <p>Q1b Writes <math>4 + n \times 5</math> instead of <math>5(n + 4)</math>.</p> <p>Q1c Writes <math>4 + n \div 5</math> instead of <math>\frac{4+n}{5}</math>.</p> <p>Q2 <math>2(n+3) = 2n+3</math> is counted as correct.</p> <p>Q2 <math>(5n)^2 = 5n^2</math> is counted as correct.</p> <p>Q2 <math>(n+3)^2 = n^2 + 3^2</math> is counted as correct.</p>	<ul style="list-style-type: none"> <li>Which one of the following is the odd one out and why?</li> <li>Think of a number, add 3, and then multiply your answer by 2.</li> <li>Think of a number, multiply it by 2, and then add 3.</li> <li>Think of a number, multiply it by 2, and then add 6.</li> </ul>
<p>Student identifies errors but does not give explanations.</p> <p>In question 2, there are corrections to the first, third, and fourth statements, but no explanation or diagram is used to explain why they are incorrect.</p>	<ul style="list-style-type: none"> <li>How would you write down expressions for these areas?</li> <li>Can you do this in different ways?</li> </ul>

# Pre-Assessment Page 1

## Expressions and Areas

1(a) Check (✓) every expression that represents the area shaded in the following diagram:



i	ii	iii	iv	v
$2 \times 3 + 5$	$2 \times 3 + 2 \times 5$	$3 + 5 \times 2$	$3 + 5 + 3 + 5$	$2 \times (3 + 5)$

Explain your choices:

.....

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.....

.....

2. (a) Explain the difference in meaning between  $10 \times 4 + 5$  and  $10 \times (4 + 5)$ .  
Use words or diagrams to help your explanation.

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- (b) Explain the difference in meaning between  $8^2 + 2^2$  and  $(8 + 2)^2$ .  
Use words or diagrams to help your explanation.

.....

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## Interpreting Expressions

1. Write algebraic expressions for each of the following:

a. Multiply  $n$  by 5 then add 4. ....

b. Add 4 to  $n$  then multiply by 5. ....

c. Add 4 to  $n$  then divide by 5. ....

d. Multiply  $n$  by  $n$  then multiply by 3. ....

e. Multiply  $n$  by 3 then square the result. ....

2. The equations below were created by students who were asked to write equivalent expressions on either side of the equals sign.

Imagine you are a teacher. Your job is to decide whether their work is right or wrong. If you see an equation that is false, then:

a. Cross out the expression on the right and replace it with an expression that is equivalent to the one on the left.

b. Explain what is wrong, using words or diagrams.

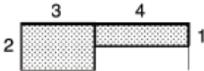
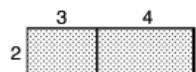
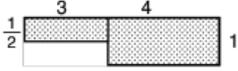
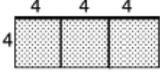
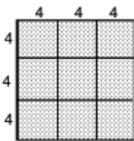
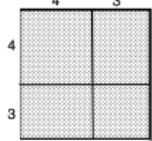
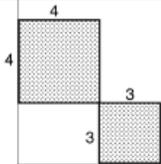
$$2(n + 3) = 2n + 3$$

$$\frac{10n - 5}{5} = 2n - 1$$

$$(5n)^2 = 5n^2$$

$$(n + 3)^2 = n^2 + 3^2 = n^2 + 9$$

# Solutions to Station 1

<p>A1</p> 	<p>E7</p> $2 \times 3 + 4$ <p>E8</p> $4 + 3 \times 2$
<p>A2</p> 	<p>E2</p> $2 \times 3 + 2 \times 4$ <p>Blank</p> $2 \times (3 + 4)$
<p>A3</p> 	<p>E10</p> $4 + 3 \times \frac{1}{2}$ <p>E14</p> $\frac{3}{2} + 4$
<p>A4</p> 	<p>E4</p> $3 \times 4^2$ <p>E3</p> $4 \times 3 \times 4$
<p>A5</p> 	<p>E5</p> $(3 \times 4)^2$ <p>Blank</p> $3 \times 3 \times 4^2$
<p>A6</p> 	<p>E9</p> $(3 + 4)^2$ <p>E12</p> $3^2 + 4^2 + 2 \times 3 \times 4$
<p>A7</p> 	<p>E1</p> $3^2 + 4^2$ <p>E13</p> $4 \times 4 + 3 \times 3$ <p>Blank</p> $(4 + 3)^2 - 2 \times 3 \times 4$
<p>Blank A8</p> 	<p>E6</p> $\frac{3}{2} + \frac{4}{2}$ <p>E11</p> $\frac{1}{2}(3+4)$ <p>E13</p> $\frac{3+4}{2}$

## Solutions to Stations 2 & 3

### **SOLUTIONS**

This table is for convenience only: it is helpful not to refer to cards by these letters in class, but rather to the content of the cards.

<b>Expressions</b>	<b>Words</b>	<b>Tables</b>	<b>Areas</b>
E1	W4		A5
E2		T4	A3
E3	W7	T1	A1
E4	W1	T6	A2
E5	W5		A2
E6	W8	T8	A6
E7	W2	T2	A4
E8	W6	T5	A7
E9	W6		A7
E10		T7	A5
E11	W9	T3	A8
E12			
	W3		
	W10		