

Expressions in the Pumpkin Patch

Write an expression with a variable, then substitute a number

Remember: an expression has a variable in it, like $3n + 5$ or $m - 6$. It does not have an equals sign. To evaluate an expression, replace the variable with a number and work it out: $3n + 5$ with $n = 4$
 $\rightarrow 3 \times 4 + 5 = 17$.

Part A — Write it, then work it out

Follow Nadia and her little brother Max through their Saturday at the Harvest Farm. For each step of the story, write an expression using the variable given, then evaluate it for the number in the last column. Show the substitution!

	Story	Expression	Substitute
1	Nadia and her little brother Max arrive at the Harvest Farm. Nadia has 14 acorns in her pocket. Max finds n more and, of course, hands them all to his sister. <i>How many acorns does Nadia have now?</i>	Expression:	Evaluate for $n = 9$.
2	Max jumps onto the picnic table, which was covered with m red maple leaves. Six of them stick to his sweater. <i>How many leaves are still on the table?</i>	Expression:	Evaluate for $m = 23$.
3	At the pumpkin stand, pumpkins cost \$4 each. Max wants ALL of them; Nadia lets him choose p pumpkins. <i>How much do they pay?</i>	Expression:	Evaluate for $p = 7$.
4	They help the farmer pack apples. There are a apples, and each box holds 12. Max insists on carrying the boxes to the car — one at a time. <i>How many trips to the car will Max make?</i>	Expression:	Evaluate for $a = 60$.
5	Hayride time! A ticket costs \$3 per person, plus a \$5 booking fee for the group. Nadia, Max and their friends make a group of k people. <i>How much does the group pay?</i>	Expression:	Evaluate for $k = 8$.
6	After the ride, Nadia gets a 250 mL jug of hot cider. Before she can stop him, Max pours himself c cups of 50 mL each. <i>How much cider is left for Nadia?</i>	Expression:	Evaluate for $c = 3$.
7	By the barn stands a scarecrow, exactly 2 metres tall. Max puts his own hat on it, which adds h centimetres. <i>How tall is the scarecrow now, in centimetres?</i>	Expression:	Evaluate for $h = 15$.
8	On the way home Max asks the farmer how busy it was. On Friday t people came; on Saturday twice as many came, plus 40 more — and two of them were Nadia and Max! <i>How many people came on Saturday?</i>	Expression:	Evaluate for $t = 120$.

Part B — Match and decode

Each expression has a letter. Find the expression that fits each situation and write its letter after it. Then read the letters in order, 1 to 6, to find the hidden word.

B1. What everyone does with the fallen leaves

Expressions

A $n - 5$

K $5n$

R $n + 5$

N $n \div 5$

I $2n + 5$

G $5 - n$

Situations

1. Five more acorns than the n I had. $\rightarrow$ ____

2. Five fewer leaves than yesterday, when there were n . $\rightarrow$ ____

3. Five bags of leaves, each with n leaves. $\rightarrow$ ____

4. Twice the number of geese, n , plus 5 more. $\rightarrow$ ____

5. A bundle of n twigs shared equally by 5 birds. $\rightarrow$ ____

6. Five geese were on the pond; n of them flew away. $\rightarrow$ ____

The word:

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B2. What the kids do next!

Expressions

P $n - 3$

U $3n$

J $n + 3$

N $n \div 3$

I $3n - 1$

M $10 - n$

G $2n - 3$

Situations

1. Three more pumpkins than the n on the porch. $\rightarrow$ ____

2. Three rows of corn with n plants in each row. $\rightarrow$ ____

3. Ten apples in the bowl; n of them were eaten. $\rightarrow$ ____

4. Three fewer than the n sunflowers that grew last year. $\rightarrow$ ____

5. One less than three times the n mushrooms we found. $\rightarrow$ ____

6. A pile of n leaves shared by 3 rakers. $\rightarrow$ ____

7. Three less than double the n cups of cider. $\rightarrow$ ____

The word:

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Part C — Which ticket is better?

The Harvest Fun Park has a corn maze, a leaf-craft tent and a hayride. There are two kinds of tickets:

Ticket A	Ticket B
\$8 to get in, then \$4 for every hour	\$20 to get in, then \$1 for every hour

a) Write an expression for the cost of each ticket for h hours: Ticket A: _____

Ticket B: _____

b) Complete the table and circle the cheaper ticket in each column.

Hours, h	1	2	3	4	5	6	8
Ticket A (\$)							
Ticket B (\$)							

c) For how many hours is Ticket A cheaper? _____ For how many hours is Ticket B cheaper? _____

d) When do both tickets cost the same? $h =$ _____ Explain how you can see this in the table AND in the expressions.

e) Your family plans to stay from 10:00 to 4:30. Which ticket should you buy, and how much will it cost? _____

Part D — Hot or cold? Celsius and Fahrenheit

Weather reports in Canada use degrees Celsius ($^{\circ}\text{C}$); many American websites use Fahrenheit ($^{\circ}\text{F}$). The two formulas connect them:

From $^{\circ}\text{C}$ to $^{\circ}\text{F}$: $F = 1.8 \times C + 32$

From $^{\circ}\text{F}$ to $^{\circ}\text{C}$: $C = (F - 32) \div 1.8$

a) Fill in the blanks. Show your substitution for at least two of them.

Autumn moment	$^{\circ}\text{C}$	$^{\circ}\text{F}$	Substitution
First frost on the pumpkins	0		
A sunny afternoon at the corn maze	20		
Morning at the school bus stop	5		
Water freezes		32	
Perfect hayride weather		59	
A warm September day		77	
Hot apple cider		176	
Gophers are already asleep underground	10		

b) Which is colder: 5°C or 45°F ? Show how you know.

c) A forecast says the temperature will rise from 10°C to 20°C . By how many $^{\circ}\text{F}$ does it rise?

_____ (Careful: it is not 10.)

d) Challenge: is there a temperature that has the same number in $^{\circ}\text{C}$ and $^{\circ}\text{F}$? Clue: it is well below zero. Fill in the table with $F = 1.8 \times C + 32$ and compare each F with its C.

C ($^{\circ}\text{C}$)	0	-10	-20	-30	-40
$F = 1.8 \times C + 32$	32				

The temperature that reads the same in both scales: _____

Answer Key (for the teacher)

Part A: 1. $14 + n = 23$. 2. $m - 6 = 17$. 3. $4p = \$28$. 4. $a \div 12 = 5$ boxes, so 5 trips. 5. $3k + 5 = \$29$. 6. $250 - 50c = 100$ mL. 7. $200 + h = 215$ cm (2 m = 200 cm!). 8. $2t + 40 = 280$.

Part B: B1: 1 R ($n + 5$), 2 A ($n - 5$), 3 K ($5n$), 4 I ($2n + 5$), 5 N ($n \div 5$), 6 G ($5 - n$) $\rightarrow$ RAKING.

B2: 1 J ($n + 3$), 2 U ($3n$), 3 M ($10 - n$), 4 P ($n - 3$), 5 I ($3n - 1$), 6 N ($n \div 3$), 7 G ($2n - 3$) $\rightarrow$ JUMPING.

Part C: a) A: $8 + 4h$, B: $20 + h$. b) A: 12, 16, 20, 24, 28, 32, 40; B: 21, 22, 23, 24, 25, 26, 28. c) A is cheaper for 1, 2 or 3 hours; B for 5 hours or more. d) $h = 4$, both \$24: the columns are equal, and $8 + 4h = 20 + h$ gives $3h = 12$. e) 6.5 hours $\rightarrow$ B: $20 + 6.5 = \$26.50$ (A would be \$34).

Part D: a) $0^\circ\text{C} = 32^\circ\text{F}$; $20^\circ\text{C} = 68^\circ\text{F}$; $5^\circ\text{C} = 41^\circ\text{F}$; $32^\circ\text{F} = 0^\circ\text{C}$; $59^\circ\text{F} = 15^\circ\text{C}$; $77^\circ\text{F} = 25^\circ\text{C}$; $176^\circ\text{F} = 80^\circ\text{C}$; $10^\circ\text{C} = 50^\circ\text{F}$. b) $45^\circ\text{F} \approx 7.2^\circ\text{C}$, so 5°C is colder (or $5^\circ\text{C} = 41^\circ\text{F} < 45^\circ\text{F}$). c) 50°F to 68°F : a rise of 18°F (each $^\circ\text{C}$ is 1.8°F). d) table: F = 32, 14, -4, -22, -40; at C = -40 the two numbers agree: $-40^\circ\text{C} = -40^\circ\text{F}$.