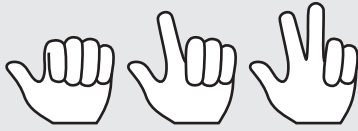


PA4-7 Multiplication Sequences

$2 \times \underline{\quad} = 6$. Find the **multiplier** of 2 to get 6 by skip counting on your fingers.



Say: 2 4 6

When you say 6, you have 3 fingers up. So the multiplier is 3: $2 \times 3 = 6$.

1. Find the multiplier between the numbers.

a) $2 \begin{matrix} \circlearrowleft \\ \times 3 \\ \circlearrowright \end{matrix} 6$

b) $2 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 8$

c) $5 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 25$

d) $5 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 40$

e) $3 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 24$

f) $3 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 18$

g) $4 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 28$

h) $4 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 16$

i) $6 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 12$

j) $3 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 9$

k) $8 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 16$

l) $3 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 12$

m) $4 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 20$

n) $9 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 27$

o) $3 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 15$

p) $4 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 24$

q) $10 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 90$

r) $10 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 70$

s) $8 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 80$

t) $6 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 60$

u) $1 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 7$

v) $4 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 24$

w) $5 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 30$

x) $8 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 80$

BONUS ▶

y) $6 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 18$

z) $8 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 32$

aa) $9 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 54$

bb) $7 \begin{matrix} \circlearrowleft \\ \times \\ \circlearrowright \end{matrix} 21$

2. Multiply the number in the circle by the number beside it. Write your answer in the blank.

a) $5 \begin{matrix} \circlearrowleft \\ \times 4 \\ \circlearrowright \end{matrix} \underline{\quad}$

b) $8 \begin{matrix} \circlearrowleft \\ \times 2 \\ \circlearrowright \end{matrix} \underline{\quad}$

c) $7 \begin{matrix} \circlearrowleft \\ \times 3 \\ \circlearrowright \end{matrix} \underline{\quad}$

d) $3 \begin{matrix} \circlearrowleft \\ \times 10 \\ \circlearrowright \end{matrix} \underline{\quad}$

e) $4 \begin{matrix} \circlearrowleft \\ \times 4 \\ \circlearrowright \end{matrix} \underline{\quad}$

f) $9 \begin{matrix} \circlearrowleft \\ \times 1 \\ \circlearrowright \end{matrix} \underline{\quad}$

g) $6 \begin{matrix} \circlearrowleft \\ \times 3 \\ \circlearrowright \end{matrix} \underline{\quad}$

h) $6 \begin{matrix} \circlearrowleft \\ \times 10 \\ \circlearrowright \end{matrix} \underline{\quad}$

i) $3 \begin{matrix} \circlearrowleft \\ \times 3 \\ \circlearrowright \end{matrix} \underline{\quad}$

j) $6 \begin{matrix} \circlearrowleft \\ \times 0 \\ \circlearrowright \end{matrix} \underline{\quad}$

k) $2 \begin{matrix} \circlearrowleft \\ \times 8 \\ \circlearrowright \end{matrix} \underline{\quad}$

l) $5 \begin{matrix} \circlearrowleft \\ \times 5 \\ \circlearrowright \end{matrix} \underline{\quad}$

m) $1 \begin{matrix} \circlearrowleft \\ \times 7 \\ \circlearrowright \end{matrix} \underline{\quad}$

n) $7 \begin{matrix} \circlearrowleft \\ \times 2 \\ \circlearrowright \end{matrix} \underline{\quad}$

o) $4 \begin{matrix} \circlearrowleft \\ \times 3 \\ \circlearrowright \end{matrix} \underline{\quad}$

p) $5 \begin{matrix} \circlearrowleft \\ \times 8 \\ \circlearrowright \end{matrix} \underline{\quad}$

3. Extend the pattern. Start by finding the multiplier.

a) $1 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 3 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 9 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

b) $1 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 2 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}} \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

c) $2 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 8 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

d) $1 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 5 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

e) $2 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 6 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

f) $3 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 6 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

BONUS ▶

$10 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 20 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}} \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}} \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

4. On a TV quiz show, the points double for every question. The 1st question is worth 1 point.

a) What is the 2nd question worth? _____

b) What is the 3rd question worth? _____

c) What is the 5th question worth? _____

5. a) The money that Shelly invests doubles every 10 years. If she starts with \$20, how much money will Shelly have after 40 years?

BONUS ▶ How much money will Shelly have if the \$20 she invests triples every 10 years?

BONUS ▶ Extend the pattern.

a) $1 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 3 \begin{matrix} \circ \\ + \\ \circ \end{matrix}, 5 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}} \begin{matrix} \circ \\ + \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

b) $1 \begin{matrix} \circ \\ + \\ \circ \end{matrix}, 3 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 6 \begin{matrix} \circ \\ + \\ \circ \end{matrix}, \underline{\hspace{1cm}} \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

c) $3 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, 6 \begin{matrix} \circ \\ - \\ \circ \end{matrix}, 5 \begin{matrix} \circ \\ \times \\ \circ \end{matrix}, \underline{\hspace{1cm}} \begin{matrix} \circ \\ - \\ \circ \end{matrix}, \underline{\hspace{1cm}}$

PA4-8 Pattern Rules

1. Continue the sequence by adding the number given.

- a) (add 3) 31, 34, _____, _____, _____ b) (add 5) 70, 75, _____, _____, _____
c) (add 4) 31, 35, _____, _____, _____ d) (add 9) 11, 20, _____, _____, _____

2. Continue the sequence by subtracting the number given.

- a) (subtract 3) 15, 12, _____, _____ b) (subtract 4) 46, 42, _____, _____
c) (subtract 5) 131, 126, _____, _____ d) (subtract 7) 49, 42, _____, _____

3. Continue the sequence by multiplying by the number given.

- a) (multiply by 3) 1, 3, _____, _____ b) (multiply by 2) 5, _____, _____
c) (multiply by 5) 1, _____, _____ d) (multiply by 4) 1, _____, _____

4. Write the first five terms of the pattern, given the pattern rule.

- a) Start at 3. Add 4 each time. _____, _____, _____, _____, _____
b) Start at 27. Subtract 2 each time. _____, _____, _____, _____, _____
c) Start at 1. Multiply by 2 each time. _____, _____, _____, _____, _____

BONUS ►

Make a rule for a pattern. Then make a pattern given by the rule.

My rule: _____

My pattern: _____, _____, _____, _____, _____

5. Which one of the following sequences was made by adding 3? Circle it.

Hint: Check all the numbers in the sequence.

A. 3, 5, 9, 12

B. 3, 6, 8, 12

C. 3, 6, 9, 12

6. What number was added each time to make the pattern?

- a) 2, 5, 8, 11 add _____ b) 15, 17, 19, 21 add _____
c) 41, 46, 51, 56 add _____ d) 19, 22, 25, 28 add _____
e) 21, 27, 33, 39 add _____ f) 41, 45, 49, 53 add _____

7. What number was subtracted each time to make the pattern?

- | | | | |
|-----------------------|----------------|-------------------|----------------|
| a) 18, 16, 14, 12 | subtract _____ | b) 35, 30, 25, 20 | subtract _____ |
| c) 100, 99, 98, 97 | subtract _____ | d) 41, 38, 35, 32 | subtract _____ |
| e) 180, 170, 160, 150 | subtract _____ | f) 90, 84, 78, 72 | subtract _____ |

8. What number do you multiply by each time to make the pattern?

- | | | | |
|------------------|-------------------|-----------------|-------------------|
| a) 1, 5, 25, 125 | multiply by _____ | b) 2, 6, 18, 54 | multiply by _____ |
| c) 1, 6, 36 | multiply by _____ | d) 3, 12, 48 | multiply by _____ |
| e) 2, 8, 32 | multiply by _____ | f) 1, 7, 49 | multiply by _____ |

9. State the rule for the following patterns.

- | | | | |
|--------------------------|--------------------------|-------------------------|------------------|
| a) 119, 112, 105, 98, 91 | <u>subtract</u> _____ | b) 1, 9, 17, 25, 33, 41 | <u>add</u> _____ |
| c) 3, 6, 12, 24 | <u>multiply by</u> _____ | d) 1, 4, 16, 64 | _____ |

10. Find the rule for the pattern, then fill in the blanks.

- | | |
|------------------------------------|--|
| a) 12, 17, 22, _____, _____, _____ | The rule is: <u>Start at 12 and</u> _____. |
| b) 1, 2, 4, _____, _____, _____ | The rule is: _____. |
| c) 47, 42, 37, _____, _____, _____ | The rule is: _____. |

BONUS ► In Question 10, which term in part c) will be equal to the first term in part a)?

11. Two sequences start at 5. The first sequence adds 10 each time. The second sequence doubles each time. Which terms in the first sequence are greater than the same terms in the second sequence? Explain.

PA4-9 Introduction to T-tables

Rick makes a growing pattern with blocks.

He records the number of blocks in each figure in a **T-table**.

He writes the number of blocks he adds each time he makes a new figure in a circle.

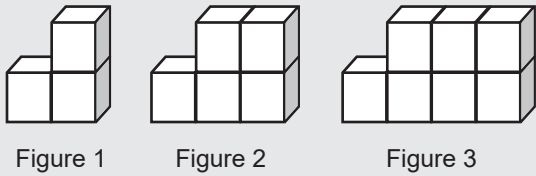
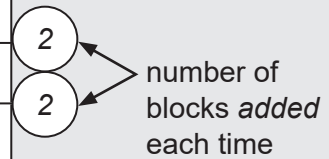


Figure	Number of Blocks
1	3
2	5
3	7



The number of blocks in the figures are 3, 5, 7,

Rick writes a **rule** for this number pattern: *Start at 3 and add 2 each time.*

1. Rick makes another growing pattern with blocks. How many blocks does he add to make each new figure? Write your answer in the circles. Then write a rule for the pattern.

a)

Figure	Number of Blocks
1	3
2	7
3	11

Rule: Start at 3 and

b)

Figure	Number of Blocks
1	2
2	6
3	10

Rule: _____

c)

Figure	Number of Blocks
1	2
2	4
3	6

Rule: _____

d)

Figure	Number of Blocks
1	1
2	6
3	11

Rule: _____

e)

Figure	Number of Blocks
1	5
2	9
3	13

Rule: _____

f)


Figure	Number of Blocks
1	12
2	18
3	24

Rule: _____

2. Extend the number pattern. How many blocks would be used in the 6th figure?


a)

Figure	Number of Blocks
1	2
2	7
3	12




b)

Figure	Number of Blocks
1	3
2	6
3	9



c)


Figure	Number of Blocks
1	3
2	8
3	13



3. Fill in the missing numbers.


a)

Figure	Number of Blocks
1	2
2	7
3	12
4	
5	22




b)

Figure	Number of Blocks
1	8
2	12
3	
4	
5	24



c)

Figure	Number of Blocks
1	7
2	
3	11
4	
5	15



4. Amy makes an increasing pattern with blocks. After making the 3rd figure, she has only 14 blocks left. Does she have enough blocks to complete the 4th figure?

a)

Figure	Number of Blocks
1	3
2	7
3	11

yes no

b)

Figure	Number of Blocks
1	7
2	10
3	13

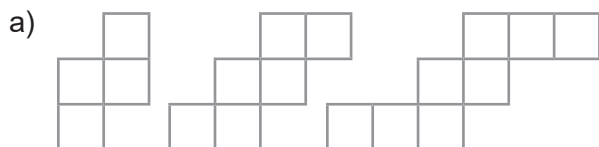
yes no

c)

Figure	Number of Blocks
1	1
2	5
3	9

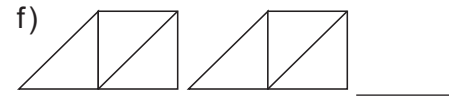
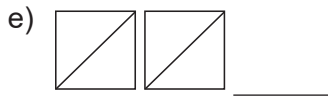
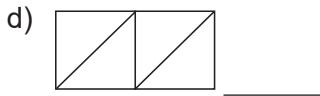
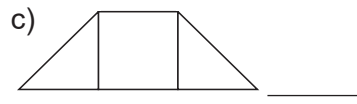
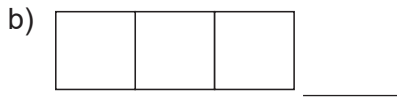
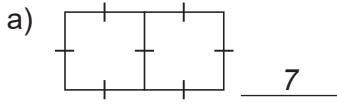
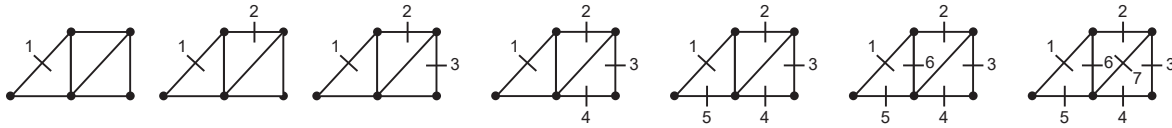
yes no

5. How many squares are needed to make the 5th figure in the pattern?
Make a table to show your answer.



PA4-10 T-tables

1. Count the number of line segments in each figure. Hint: Count around the outside of the figure first, marking each line segment as you count. Example:



2. Continue the pattern below, then complete the table.

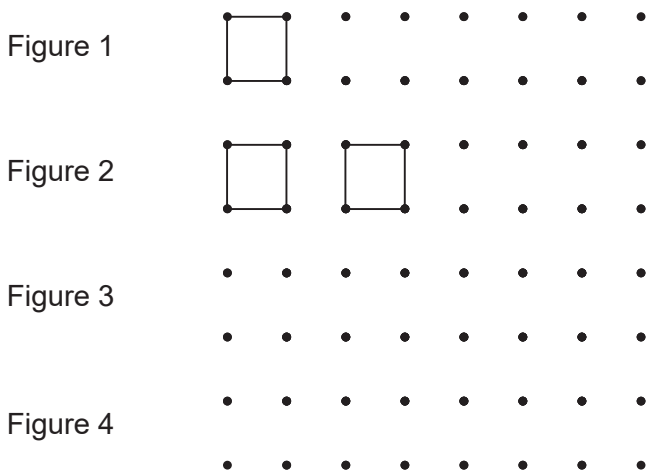


Figure	Number of Line Segments
1	4
2	8
3	
4	

How many line segments would Figure 5 have? _____

3. Continue the pattern below, then complete the table.

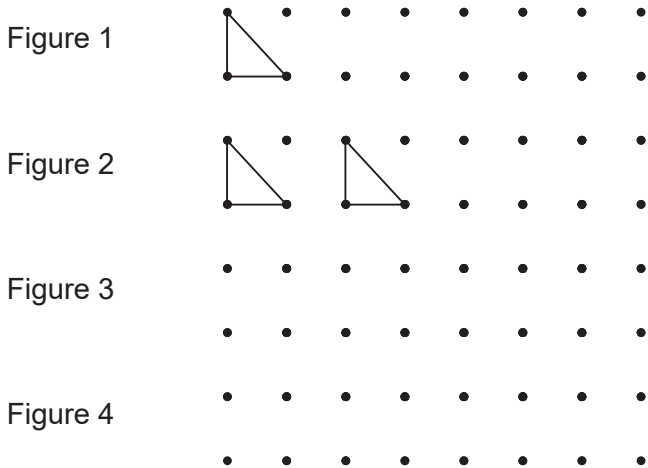


Figure	Number of Line Segments
1	
2	
3	
4	

How many line segments would Figure 5 have? _____

4. Continue the pattern below, then complete the table.

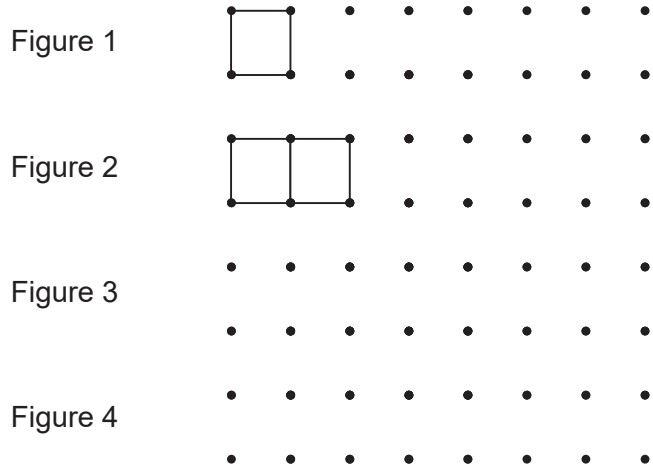


Figure	Number of Line Segments
1	
2	
3	
4	

- a) How many line segments would Figure 5 have? _____
- b) How many line segments would Figure 6 have? _____
- c) How many line segments would Figure 7 have? _____

5. Continue the pattern below, then complete the table.

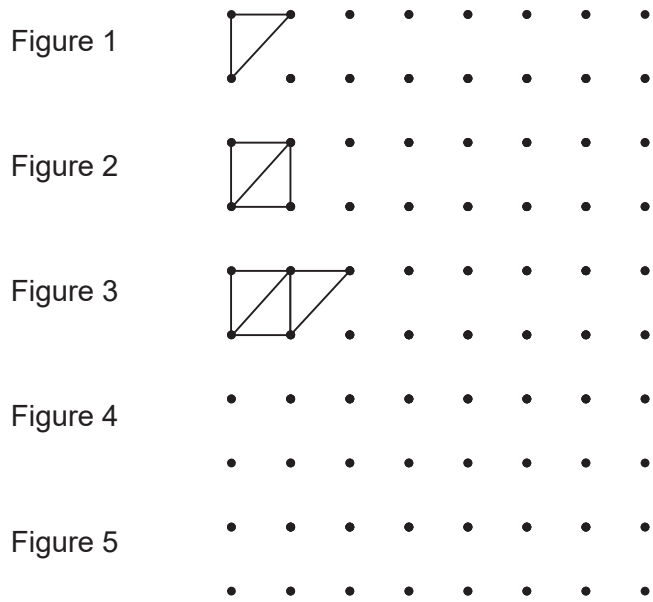


Figure	Number of Line Segments
1	
2	
3	
4	
5	

- a) How many line segments would Figure 6 have? _____
- b) How many line segments would Figure 7 have? _____
- c) How many line segments would Figure 8 have? _____

6. Complete the table. How many young would 5 animals have?

a)

Arctic Fox	Number of Cubs
1	5
2	10

b)

Woodchuck	Number of Pups
1	4
2	8

c)

White-tailed Deer	Number of Fawns
1	2
2	4

d)

Osprey	Number of Eggs
1	3
2	6

7. Complete the table. How much money would Vicky earn for 4 hours of work?

a)

Hours Worked	Dollars Earned
1	\$9

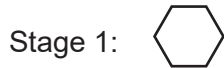
b)

Hours Worked	Dollars Earned
1	\$10

c)

Hours Worked	Dollars Earned
1	\$8

8. Glen makes a design using triangles and hexagons. He adds two triangles and a hexagon at each stage.

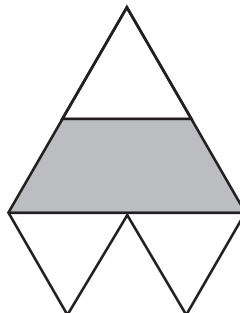


a) Fill in the table.

b) Glen has 6 hexagons and 9 triangles. Does he have enough triangles to use all 6 hexagons? _____

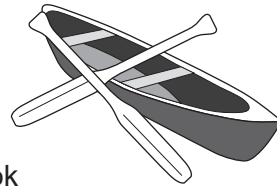
Stage	Hexagons	Triangles
1	1	0
2	2	
3		

9. Hanna makes Christmas ornaments like the one shown. She has 5 trapezoids (the shaded figure). Fill in the table to show how many triangles she will need.



Number of Ornaments	Trapezoids	Triangles

PA4-11 Problem Solving with Patterns



1. A marina rents canoes at \$7 for the first hour and \$4 for every hour after that. How much would it cost to rent a canoe for 6 hours?

2. A bookstore has a special sale: the first book you buy costs \$10 and each book after that costs \$5. Arsham has \$25. Does he have enough to buy five books?

3. Draw pictures or make models (using blocks or counters) that match the pattern.

a)

Figure	Number of Objects
1	4
2	6
3	8

b)

Figure	Number of Objects
1	3
2	6
3	9

c)

Figure	Number of Objects
1	4
2	7
3	10

4. Lynn's sapling grows 2 cm in July. It grows 3 cm each month after that. Ray's sapling grows 3 cm in July. It grows 1 cm each month after that. Whose sapling is taller by the end of September?

5. Avril and Jane light a candle the same time. Avril's candle starts at 28 cm tall. It burns down 4 cm every hour. Jane's candle is 21 cm tall when she lights it. It burns down 3 cm every hour. Whose candle is taller after 5 hours?

6. Sandy bikes 20 km on the first day of a trip. She bikes 30 km every day after that. How far has she biked after 4 days?

BONUS ▶ Tristan is 900 km from home on Monday morning. He drives home, travelling 200 km every day.

- How far from home is he on Wednesday morning?
- On which day does he arrive home?

Day	Distance from Home in the Morning (km)
Monday	900