FILLING CONTAINERS: FLOW GRAPHS

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

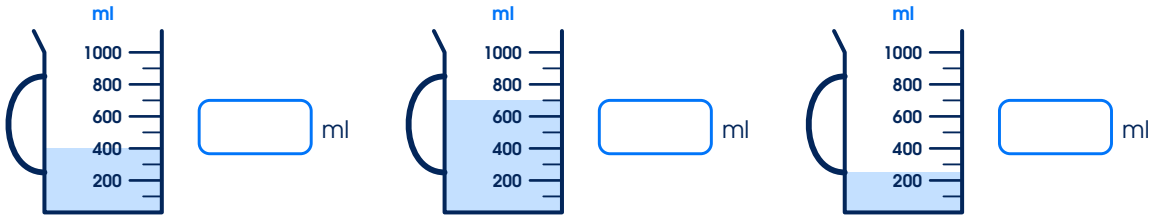
Water flows in at the same rate.

In a narrow container, the water rises faster.

Same amount of water:



1 How much water is in each jug?



2 A tap fills a bucket with 5 litres of water every minute.

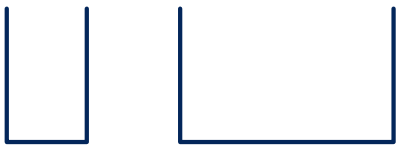
a) How much water in 4 minutes?

× 4 (**1 minute = 5 litres** / **4 minutes =** ☐ litres) ☐

b) How long to fill 30 litres?

☐ (**1 minute = 5 litres** / ☐ minutes **= 30 litres**) ☐

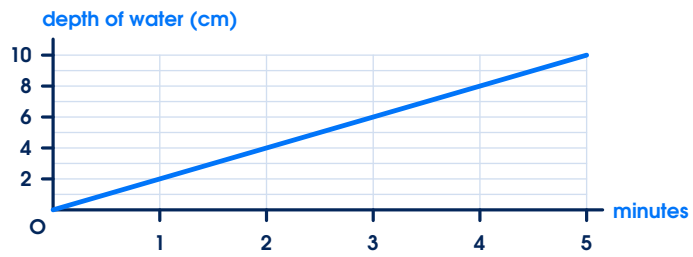
3 The same tap fills container A and container B. Circle your answers.



a) Which one fills up first? (A) (B)

b) Where does the water rise faster? (A) (B)

4 Water flows into a tank at a constant rate.



a) Depth after 3 minutes? ☐ cm

b) Time to reach 8 cm? ☐ minutes

c) The graph is (STRAIGHT) (CURVED)

FILLING CONTAINERS: FLOW GRAPHS

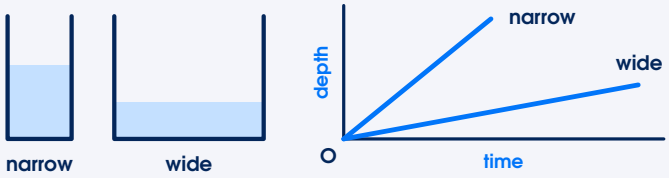
SUPPORT

NAME _____ CLASS _____ DATE _____

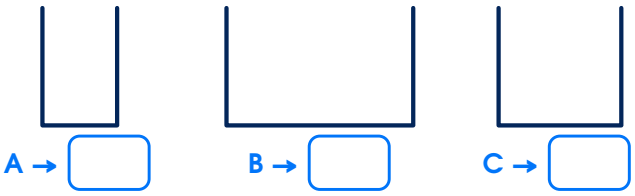
KEY IDEA

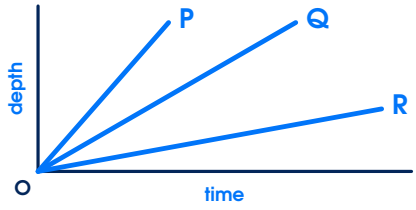
Constant flow + straight sides = a straight-line graph.

A wider container gives a less steep line.

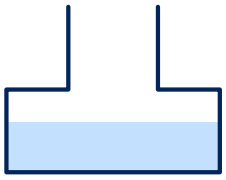


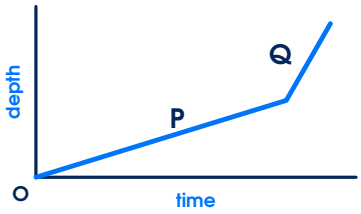
1 The same tap fills each container. Match each container to its graph P, Q or R.





2 This container is filled at a constant rate. The graph shows the depth of the water.





a) Which part shows the bottom filling?

P Q

b) Why is Q steeper?

_____

3 A bath holds 120 litres. How long does each tap take to fill it?

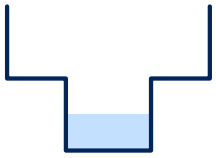
a) A tap that gives 8 litres per minute

× 15 (1 minute = 8 litres ; ☐ minutes = 120 litres) ☐

b) A tap that gives 12 litres per minute

☐ (1 minute = 12 litres ; ☐ minutes = 120 litres) ☐

4 This container is filled at a constant rate.





a) Sketch the graph on the axes.

b) The graph is made of

STRAIGHT LINES A CURVE

FILLING CONTAINERS: FLOW GRAPHS

CORE

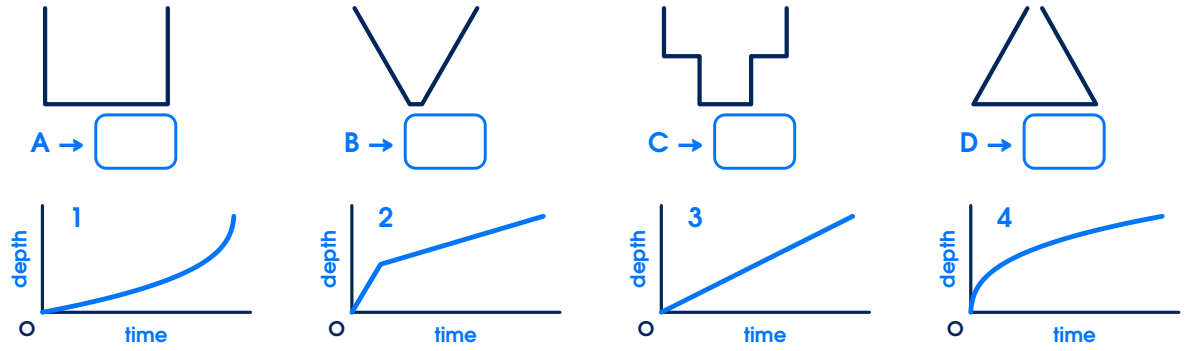
NAME _____ CLASS _____ DATE _____

KEY IDEA

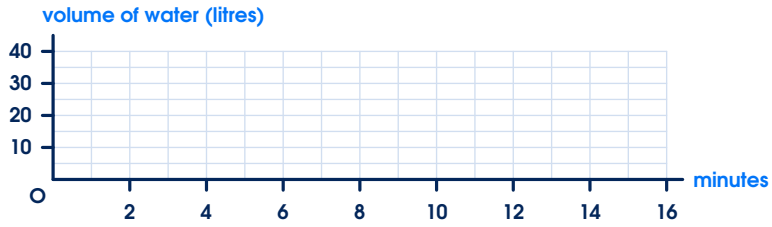
With a constant rate of flow, the depth rises faster where the container is narrower. Vertical sides give straight lines; sloping or curved sides give a curve.

FLUENCY

1 Each container is filled at a constant rate. Match each container to its graph.



2 A tank holds 40 litres of water. It drains at a constant 2.5 litres per minute.



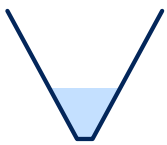
a) Draw the graph.

b) Empty after ☐ min

c) Volume after 6 min? ☐ litres

REASONING

3 Kofi says the depth–time graph for this vase is a straight line.



a) Explain why Kofi is wrong.

.....

.....

b) Sketch the correct graph.



4 Ana says every depth–time graph for filling a container starts at O. Show she is wrong.

.....

.....

FILLING CONTAINERS: FLOW GRAPHS

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) A constant flow gives a straight-line graph. ALWAYS SOMETIMES NEVER

b) A container with vertical sides gives a straight line. ALWAYS SOMETIMES NEVER

c) Where a container is wider, its graph is steeper. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 A cuboid tank has a base 50 cm by 40 cm. Water flows in at 4 litres per minute.

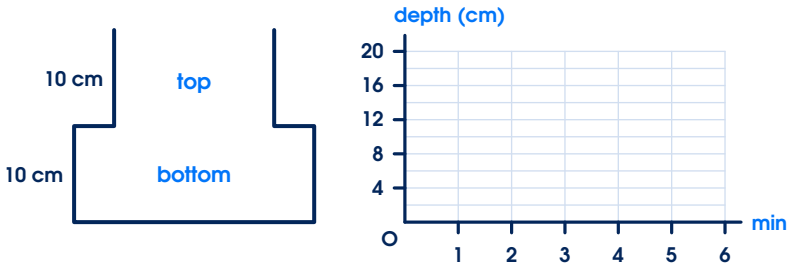
1 litre = 1000 cm^3

a) By how many cm does the depth rise each minute? _____ cm

b) How long until the water is 30 cm deep? _____ min

3 This container is made from two cuboids. Water flows in at 1.5 litres per minute.

Bottom: base 30 cm by 20 cm, 10 cm deep. Top: base 20 cm by 15 cm, 10 cm deep.



a) Bottom fills in _____ min

b) Top fills in _____ min

c) Draw the graph.

★ CHALLENGE FOR ALL

4 A bath holds 150 litres. The tap adds 12 litres per minute, but the plug is out and 4 litres per minute drain away.

a) How long does the bath take to fill? Give minutes and seconds. _____

b) Instead, the plug is put in after 10 minutes. How long does it now take to fill the bath altogether? _____

FILLING CONTAINERS: FLOW GRAPHS – ANSWERS

ANSWERS

BUILDING BLOCKS

1. 400 ml · 700 ml · 250 ml
2. a) × 4 on both sides: 20 litres · b) × 6 on both sides: 6 minutes
3. a) A · b) A (it is narrower)
4. a) 6 cm · b) 4 minutes · c) STRAIGHT

SUPPORT

1. A (narrow) → P · B (wide) → R · C → Q
2. a) P · b) the top part is narrower, so the depth rises faster
3. a) × 15 on both sides: 15 minutes · b) × 10 on both sides: 10 minutes
4. a) a steep straight line, then a less steep straight line · b) 2 STRAIGHT LINES

CORE

1. A → 3 · B → 4 · C → 2 · D → 1
2. a) straight line from (0, 40) to (16, 0) · b) 40 ÷ 2.5 = 16 minutes · c) 40 – 15 = 25 litres
3. a) the vase gets wider towards the top, so the depth rises more and more slowly: the graph is a curve · b) a curve that starts steep and gets less steep
4. e.g. a container that already has some water in it: the graph starts part-way up the depth axis

GREATER DEPTH

1. a) Sometimes: only if the container has vertical sides (a cone gives a curve) · b) Always · c) Never: wider means the depth rises more slowly, so it is less steep
2. a) base area 2000 cm^2; 4000 cm^3 per minute ÷ 2000 = 2 cm per minute · b) 30 ÷ 2 = 15 minutes
3. a) 6000 cm^3 ÷ 1500 = 4 minutes · b) 3000 cm^3 ÷ 1500 = 2 minutes · c) straight lines (0, 0) to (4, 10) to (6, 20)
4. a) it gains 8 litres per minute: 150 ÷ 8 = 18.75 min = 18 minutes 45 seconds · b) after 10 min it has 80 litres; 70 ÷ 12 = 5 min 50 s more, so 15 minutes 50 seconds altogether