21 N is a number.

If 6 is subtracted from three times N, the result is 39.

Which equation matches this description?

$3N - 6 = 39$	$3(N - 6) = 39$	$6 - 3N = 39$	$3N = 39 - 6$
Ⓐ	B	C	D

22 A man invests $20,000 using the simple interest formula. Interest is paid at a rate of 5% per year.

$$I = P \times \frac{R}{100} \times T$$

I = amount of interest

P = amount invested

R = interest rate per year

T = number of years

What is the amount of interest after four years?

$40	$1,000	$4,000	$400,000
A	B	C	Ⓓ

23 x is a multiple of 5.

The product of $(x + 2)$ and $(x + 4)$ is divided by 5.

What is the remainder?

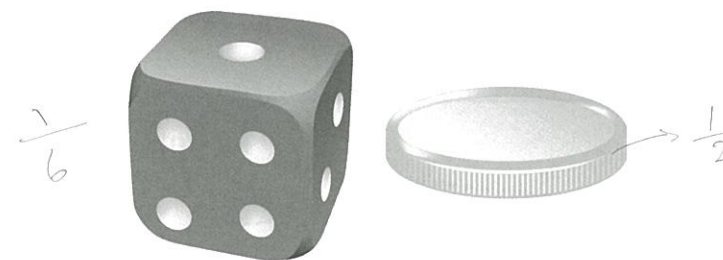| 1	2	3	6
A	B	Ⓒ	D

24 These are the points scored by Lin in four matches.

34, 23, 51, 68

The record average for 5 matches is 51.

How many points does Lin need to score in the fifth match to equal the record?

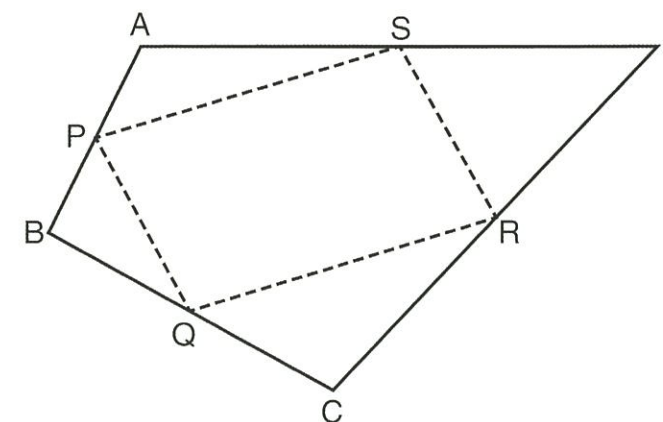| 28	44	58	79
A	B	C	D

25 A standard fair dice is rolled and a fair coin is tossed.

What is the probability of getting a 1 and a tail?

$\frac{2}{3}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{12}$
A	B	C	Ⓓ

26 The quadrilateral PQRS is obtained by joining the mid-points of the sides of the quadrilateral ABCD.

Which type of quadrilateral must PQRS be?

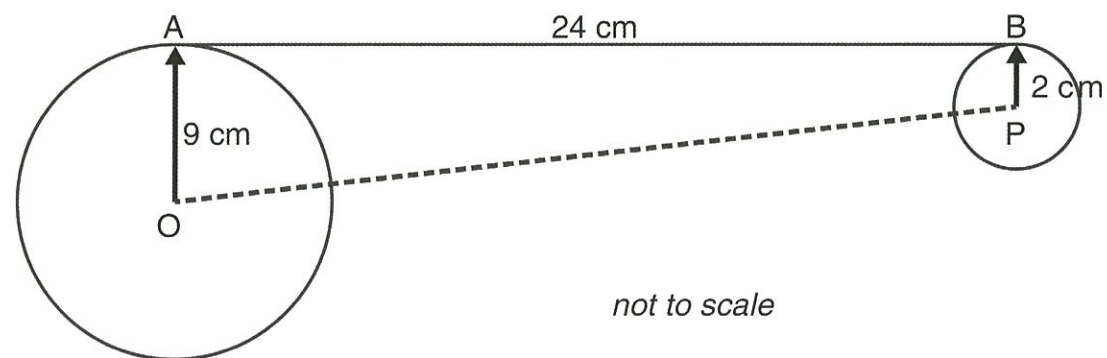| parallelogram	rhombus	rectangle	square
Ⓐ	B	C	D

27 Cube A has a surface area of 600 cm².

Cube B has side lengths 2 cm shorter than cube A.

What is the surface area of cube B?

300 cm²	384 cm²	512 cm²	576 cm²
A	B	C	D

28 The diagram shows two circles with centres O and P.

Line segment AB is a tangent to both circles.

not to scale

What is the length of line segment OP?

35 cm	31 cm	25 cm	24 cm
A	**B**	**C**	**D**

29 The mean of the following data is 9.

5, 5, *x*, 11, 12, 15, *x*, *x*, 5, 7

What is the value of *x*?

1	6	10	30
A	**B**	**C**	**D**

30 A circle is inscribed in a right-angled triangle ABC.

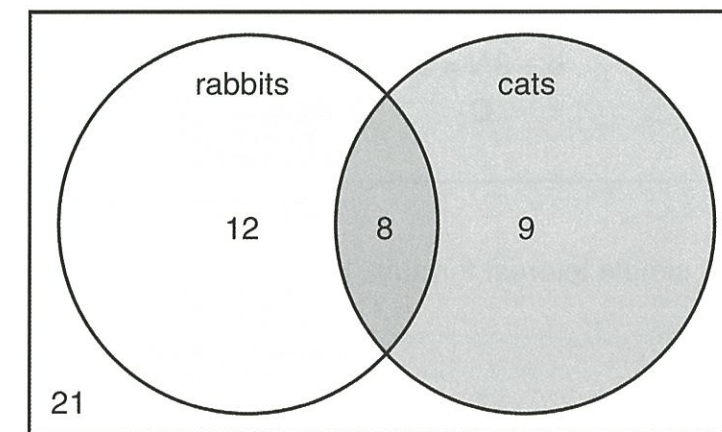The radius of the circle is 4 cm. The length of side AB is 10 cm.

not to scale
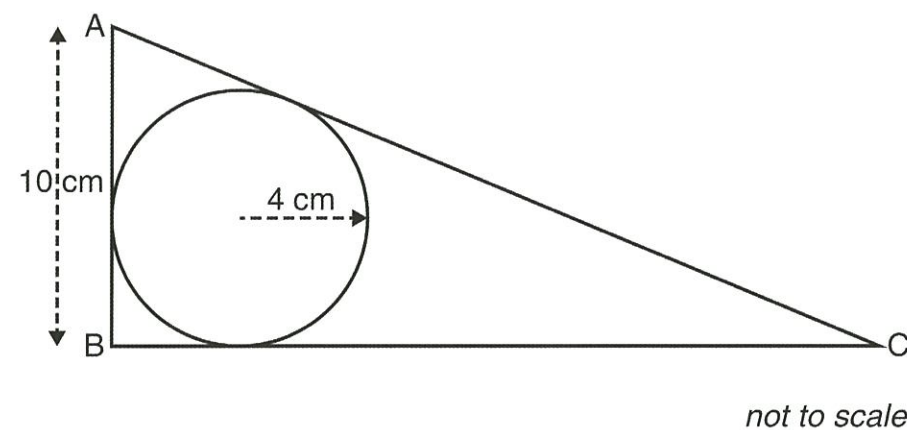
What is the perimeter of triangle ABC?

50 cm	$24 + \sqrt{296}$ cm	$20 + 10\sqrt{2}$ cm	60 cm
A	**B**	**C**	**D**

18 There are 50 people in a group.

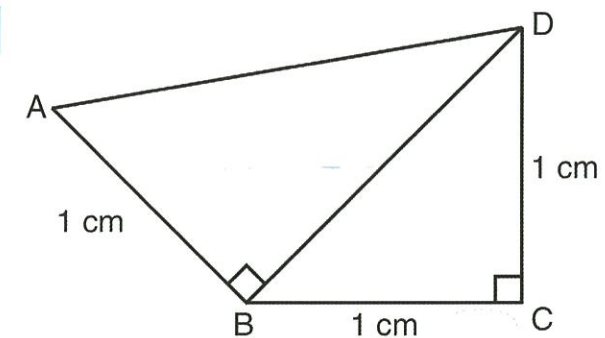This Venn diagram shows the number of people owning pets.

One person is selected at random from the group.

What is the probability of that person owning a rabbit?

$\dfrac{12}{29}$	$\dfrac{20}{29}$	$\dfrac{12}{50}$	$\dfrac{20}{50}$
A	**B**	**C**	**D**

19

not to scale

What is the length of AD?

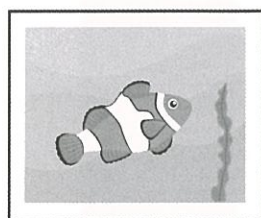| $\sqrt{3}$ cm	3 cm	$\sqrt{2}$ cm	1.5 cm
A	**B**	**C**	**D**

20 The graph of which of these equations is perpendicular to $y = 2x + 4$?

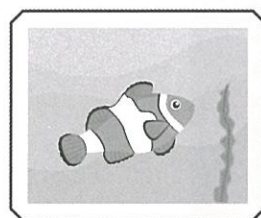| $y = -\dfrac{1}{2}x + 4$	$y = \dfrac{1}{2}x + 4$	$y = -2x + 4$	$y = -2x - \dfrac{1}{4}$
A	**B**	**C**	**D**

16 A white border will be added to this painting. Each point on the border will be exactly 2 cm away from the nearest point on the painting.
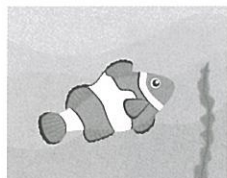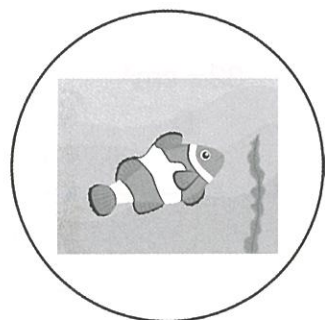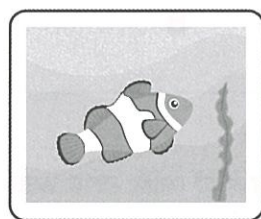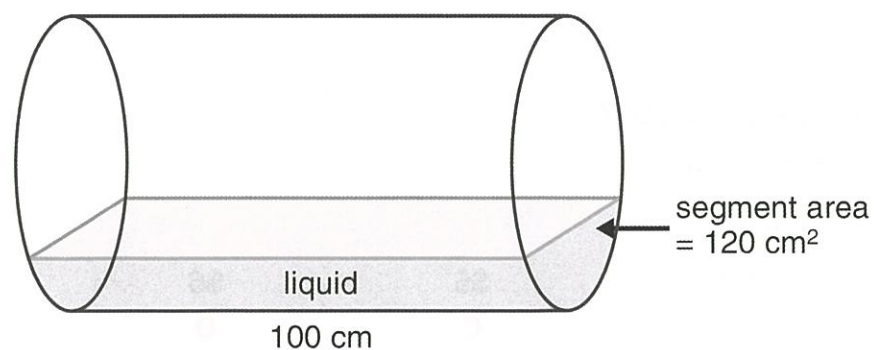

What will the painting look like?
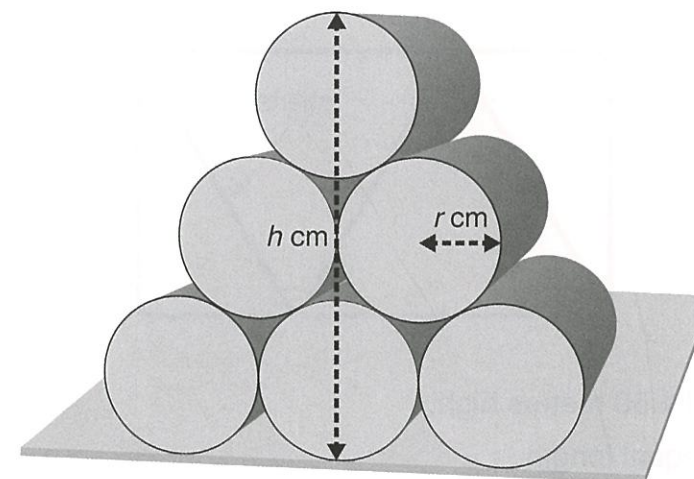

A

B

C

D

---

17 A cylindrical drum is partially filled with liquid.

A cross section of the drum reveals that the segment area covered by liquid is 120 cm².

segment area = 120 cm²

liquid

100 cm

What is the volume of liquid in the drum?

700 cm³	12,000 cm³	15,400 cm³	61,600 cm³
A	**B**	**C**	**D**

---

31 There are 6 identical cylindrical containers in a stack.

h cm r cm

The radius of each container is r cm.

Which equation gives the height (h) of this stack?

$$h = 5r \qquad h = 6r \qquad h = \frac{\sqrt{3}}{2}(6r) \qquad h = \frac{\sqrt{3}}{2}(4r) + 2r$$

A   **B**   **C**   **D**

---

32 The volume of a cone is given by the rule $V = \frac{1}{3}\pi r^2 h$.

A cone has a height of 12 cm and a volume of 25π cm³.

What is the **circumference** (in cm) of the base of the cone?

2.5π	5π	10π	12.5π
A	**B**	**C**	**D**

---

33 PQ and PR are two tangents to the circle.

O is the centre of the circle.

QT and RT are two chords of the circle.

What is the value of x?

$40°$

not to scale

80	90	100	140
(A)	**B**	**C**	**D**

Grade 10 Mathematics 2015   Grade 10 Mathematics 2015
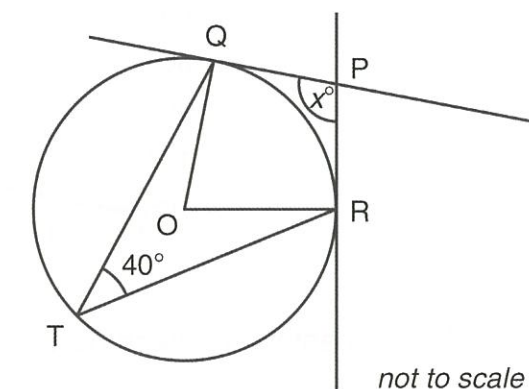
34 A farm gate is in the shape of a rectangle.

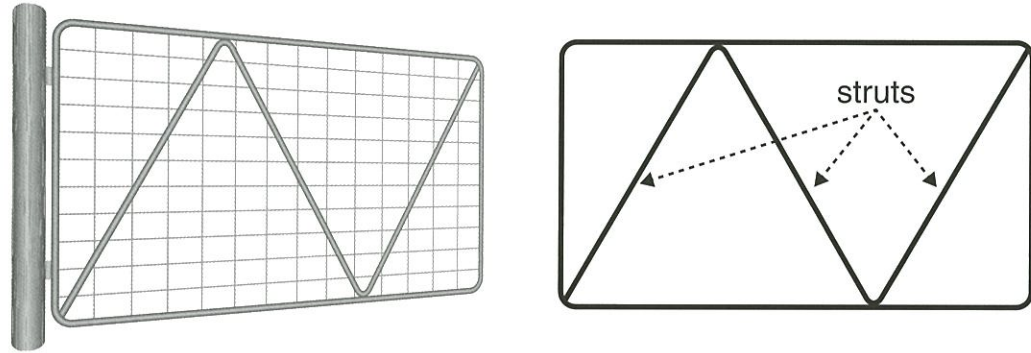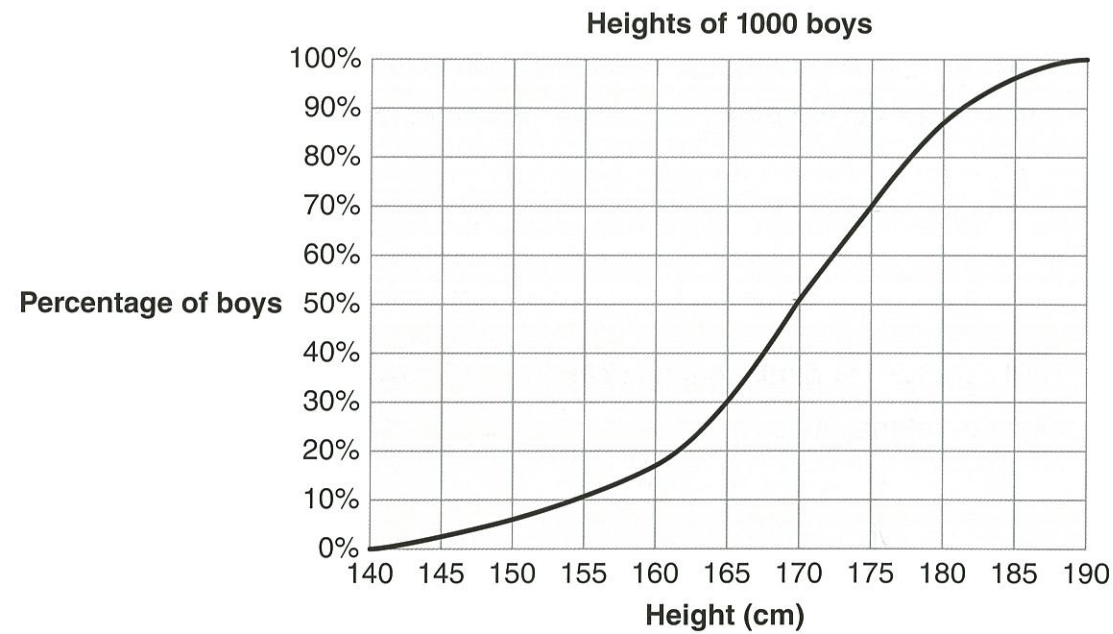The gate is 2.70 metres wide and 1.50 metres high.

It is supported by three struts of equal length.

What is the length of one strut?

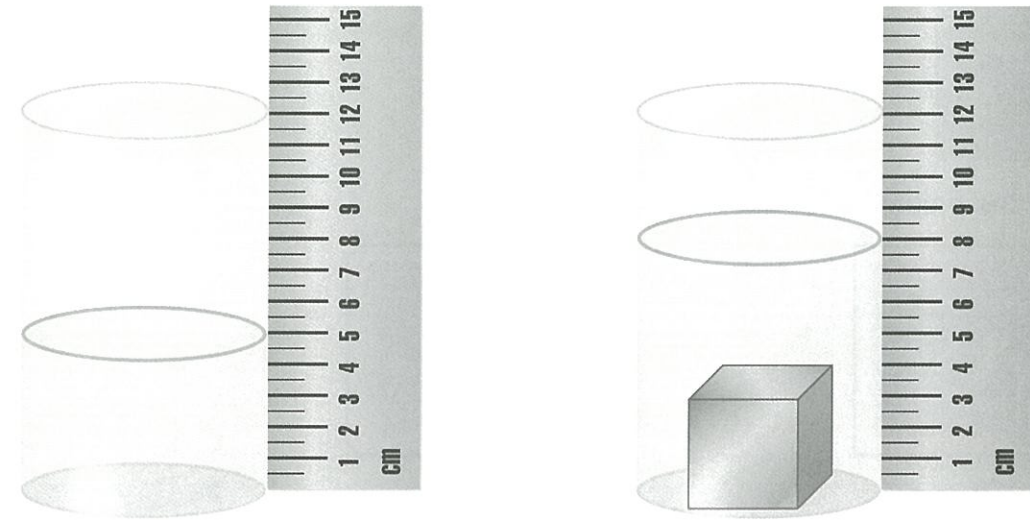| 1.20 metres	1.53 metres	1.55 metres	1.75 metres
A	**B**	**C**	**D**

35 The graph shows the cumulative frequency data for the heights of 1000 teenage boys.

What percentage of these boys are taller than 175 cm?

30%	55%	70%	75%
A	**B**	**C**	**D**

13 A cylinder containing water has a radius of 2 cm.

A solid metal cube is completely immersed in the water as shown.

What is the volume of the metal cube?

3π cm^3	9π cm^3	12π cm^3	32π cm^3
A	**B**	**C**	**D**

14 There is a 16 litre mixture of milk and water.

The ratio of milk to water is 5 : 3.

How much **more** milk should be added to the mixture to make the ratio of milk to water equal 2 : 1?

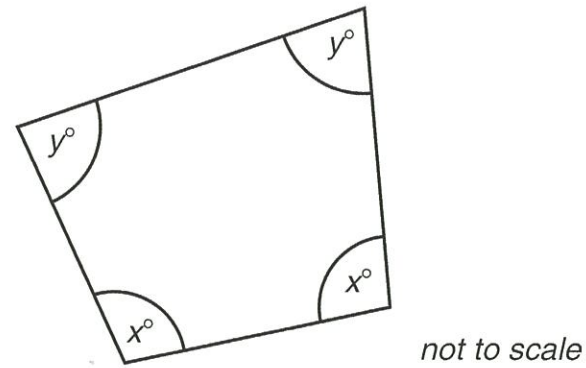| $\frac{1}{3}$ litre	1 litre	2 litres	10 litres
A	**B**	**C**	**D**

15 Two pencils and three erasers cost $17.

Two pencils and five erasers cost $23.

What is the cost of one eraser?

$2	$3	$5	$6
A	**B**	**C**	**D**

9 This is what students say about the quadrilateral on the right:

Amy – It must be a parallelogram. ✓

Lara – It must be a trapezium.

John – It must be cyclic.

Jamal – It must be a rhombus.

Who is correct?

Amy only	John only	Lara and John	John and Jamal
(A)	**B**	**C**	**D**

not to scale

---

10 This is the number of goals scored by Zola in 9 hockey matches.

6, 0, 3, 7, 3, 0, 6, 5, 6

What is the median number of goals scored?

6	5	4	3
A	**B**	**C**	**(D)**

---

11 The average distance of Neptune from the Sun is 4.5×10^9 km.

The speed of light is 3×10^5 km/sec.

How many seconds will it take a beam of light from the Sun to reach Neptune?

1.5×10^4	$1.5 \times 10^{\frac{9}{5}}$	$1.5 \times \frac{9}{5}$	0.67×10^{-4}
(A)	**B**	**C**	**D**

---

12 These are points scored by a water polo team in 9 matches.

8, 12, a, 15, a, a, 22, 14, 13

The average score for the team for all the matches is 15.

What is the value of a?

6	15	17	51
A	**(B)**	**C**	**D**

---

36 $\sqrt{12} + \sqrt{27} =$

$5\sqrt{3}$	$3\sqrt{5}$	$5\sqrt{6}$	$\sqrt{39}$
A	**B**	**C**	**D**

---

37 The Dolphins water polo team has played 5 games so far this season.

- The mean number of goals per game scored by the Dolphins is 4.4.
- The range of the goals per game scored by the Dolphins is 6.

Which of these lists could be the number of goals scored by the Dolphins?

1, 5, 4, 6, 6	2, 5, 4, 8, 3	0, 2, 5, 5, 6	3, 4, 4, 5, 6
A	**B**	**C**	**D**

---

38 This log is circular, with a diameter of 2 metres.

What is the area of the largest square cross section that can be cut from the log?

$\frac{1}{2}$ m^2	1 m^2	$\sqrt{2}$ m^2	2 m^2
A	**B**	**C**	**D**

---

39 A triangle has a side 2 cm long and a side 7 cm long.

Which of these lengths could be the third side of the triangle?

4 cm	6 cm	10 cm	14 cm
A	**B**	**C**	**D**

---

40 The diameter of the Sun is 1.4×10^6 kilometres.

The diameter of the Moon is 3.5×10^3 kilometres.

How many times greater is the diameter of the Sun than the diameter of the Moon?

2.1×10^3	4.0×10^2	4.0×10^3	4.9×10^9
A	**B**	**C**	**D**

41 A chairlift travels at 5 metres per second.

How long does it take for the chairlift to travel 3 kilometres?

A 1 minute
B 6 minutes
C 10 minutes
D 15 minutes

**42** The data shows the lengths of calls made to a customer helpline.

Length of call (minutes)	Percentage of calls
0 to < 2	30%
2 to < 4	25%
4 to < 6	22%
6 to < 8	15%
8 to < 10	8%

The median call length lies in which category?

0 to < 2 minutes	2 to < 4 minutes	4 to < 6 minutes	6 to < 8 minutes
A	**B**	**C**	**D**

43 The grey shapes and the white shapes in this diagram are squares.

What is the ratio of the white area to the grey area in the diagram?
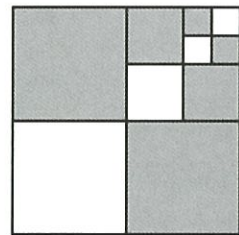
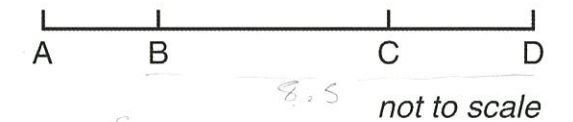| 11 : 21	11 : 32	21 : 32	21 : 64
A	**B**	**C**	**D**

5 N is a number marked on this number line.
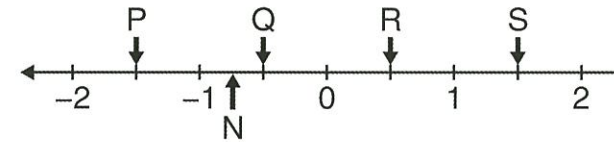
Where will N^2 be on the number line?

point P	point Q	point R	point S
A	**B**	**C**	**D**

6 AD is a straight line segment.

The ratio of the lengths of AB to BC is 1 : 2.

The ratio of the lengths of BC to CD is 8 : 5.
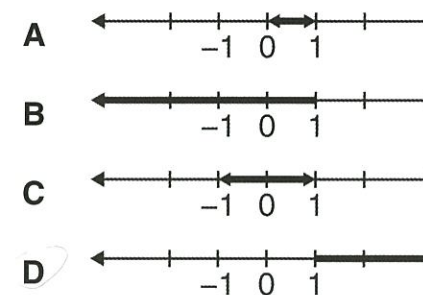
What is the ratio of AB to CD?

not to scale

1 : 5	4 : 5	3 : 13	9 : 7
A	**B**	**C**	**D**

7 A biased coin is painted red on one side. The probability of the coin landing on red is 0.4.

The coin is tossed twice.

What is the probability of it landing on red both times?

0.16	0.2	0.4	0.8
A	**B**	**C**	**D**

8 x and y are two real numbers where $x > 1$ and $xy = 1$.

Which number line shows the possible values for y?

A

B

C

D

1 Which of these expressions is equivalent to $\left(5\frac{1}{3}\right)^2$?

$5^2 + \left(\frac{1}{3}\right)^2$ $5^2 \times \left(\frac{1}{3}\right)^2$ $2 \times 5 \times \frac{1}{3}$ $5^2 + \frac{10}{3} + \left(\frac{1}{3}\right)^2$

     A   **B**   **C**   **D**

2 $\left(4^3\right)^3 =$

4^5 4^6 4^9 4^{32}

 A   **B**   **C**   **D**

3 The volume of a pyramid is given by the rule:
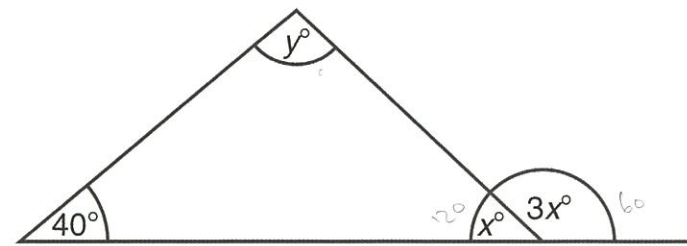
$V = \frac{1}{3} \times$ area of base $\times$ height.

The Pyramid of Giza in Egypt is a square-based pyramid as shown.

Which calculation gives the volume of the pyramid in cubic metres?

146.5 m

230.4 m
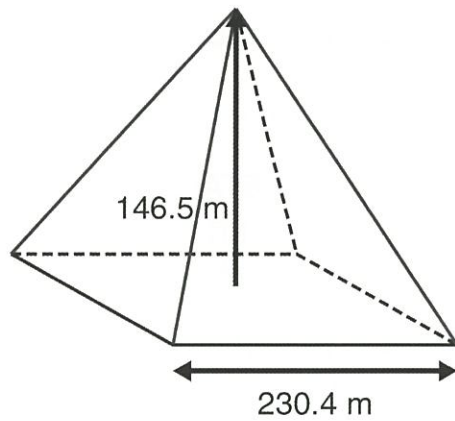
A $\frac{1}{3} \times 230.4 \times 230.4 \times 146.5$

B $\frac{1}{3} \times 146.5 \times 146.5 \times 230.4$

C $\frac{1}{3} \times \left(\frac{1}{2}(230.4) \times \frac{1}{2}(230.4)\right) \times 146.5$
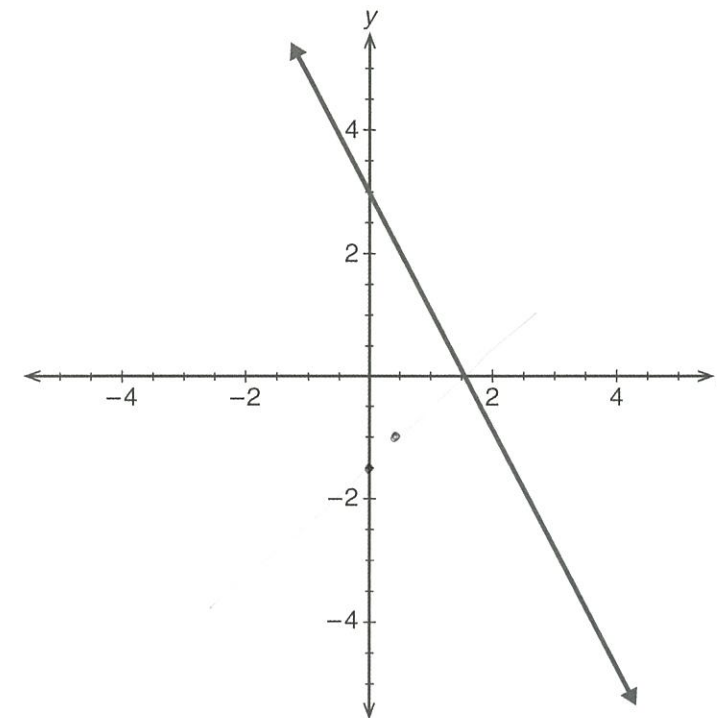
D $\frac{1}{3} \times 146.5 \times 4 \times 230.4$

4 In this triangle, what is the value y?

40° $y°$ 120 $x°$ $3x°$ 60

45   95   135   140

 A   **B**   **C**   **D**

(handwritten working:) $\frac{180}{3} = 3x$ 60 $180 - 60 = 120$ $60 + x = 180$ $180 - 60 = 180$ $40 + 120 + Y = 180$
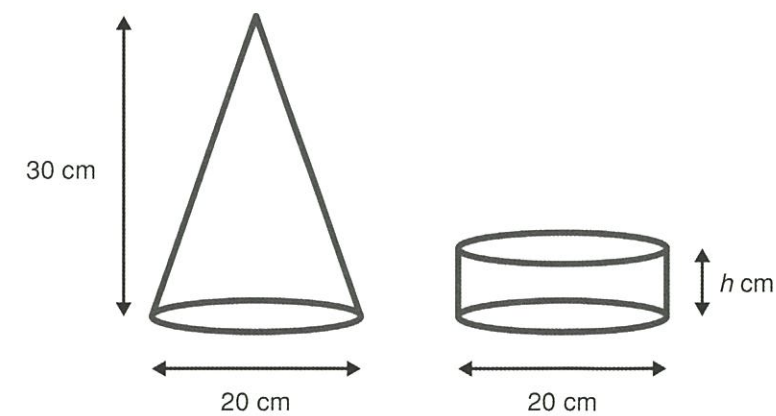
44 The equation of this linear graph is $y = -2x + 3$.

Where does the graph $y = x - 3$ intersect with the graph above?

$(0,-3)$ $(0,3)$ $(-1,2)$ $(2,-1)$

  A   (**B**)   **C**   **D**

45 The volume of a cone is given by the rule $V = \frac{1}{3}\pi r^2 h$.

30 cm h cm

20 cm   20 cm

The volume of this cone is twice the volume of this cylinder.

What is the height of the cylinder?

2 cm   5 cm   6 cm   10 cm

 A   **B**   **C**   **D**

International Benchmark Tests in English, Mathematics & Science

Mathematics

International Benchmark Tests in English, Mathematics & Science

STUDENT NAME _____

NAME OF SCHOOL _____

TEST INSTRUCTIONS

FILL IN YOUR DETAILS
Turn to your ANSWER SHEET and fill in your name, school, grade, section, today's date, your date of birth and gender.

ANSWERING QUESTIONS
Go to the MATHEMATICS ANSWER SHEET.
This test has **45 QUESTIONS**. Each question has four possible options.
Choose the BEST answer from the four options, **A, B, C** or **D**.
FILL in ONE circle on your answer sheet with a pencil.
If you make a mistake, erase the pencil mark and fill in a different circle.
You must colour the entire circle as shown below:

Correct response	**Incorrect responses**			
⬬ ✓	⊗	⊗	⊗	⊗
	Line	Very light pencil	Pen	Colored pencil
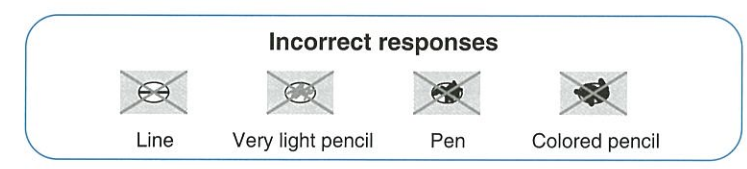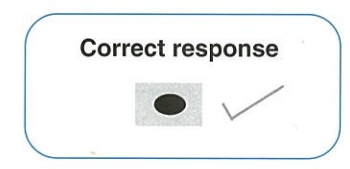
Marks are NOT deducted for incorrect answers.

ALL ANSWERS SHOULD BE MARKED ON YOUR ANSWER SHEET ONLY.

EQUIPMENT ALLOWED IN THIS TEST
You may use a 2B or B pencil for this test. You may NOT use a calculator for this test.

TIME ALLOWED FOR TEST
The time allowed to complete this test is **60 minutes**.