

PART A Mathematics

- 1 A group of drivers, consisting of 200 women and 300 men, was asked if they passed their driving test at the first attempt.

Altogether 167 of the group said they passed at the first attempt.

Of the women, 143 said they did not pass at the first attempt.

How many of the men said they passed at the first attempt?

- A 10
- B 24
- C 33
- D 57
- E 110
- F 133
- G 157

- 2 A cuboid has sides of length x , $\sqrt{2}x$ and $2x$, measured in cm.

The volume, in cm^3 , of the cuboid is numerically equal to twice the total surface area, in cm^2 , of the cuboid.

What is the value of x ?

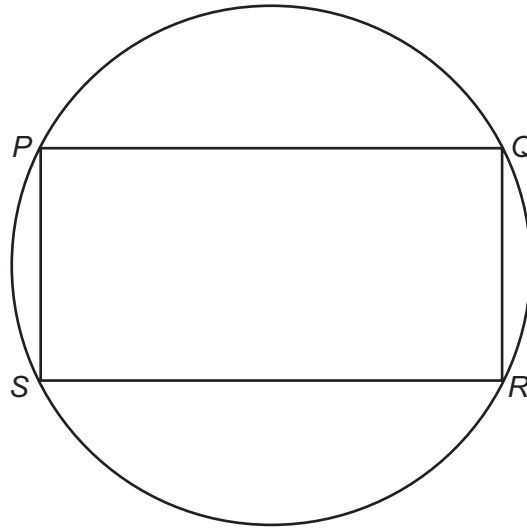
- A 10
- B $6 + 2\sqrt{2}$
- C 5
- D $3 + \sqrt{2}$
- E $\frac{5}{2}$
- F $\frac{3}{2} + \frac{1}{2}\sqrt{2}$

- 3** The line joining the points with coordinates $(p, p - 1)$ and $(1 - p, 2p)$ is parallel to the line with equation $2x + 3y + 1 = 0$

What is the value of p ?

- A** -1
- B** $-\frac{1}{7}$
- C** $\frac{1}{9}$
- D** $\frac{1}{8}$
- E** 1
- F** $\frac{5}{4}$
- G** 2
- H** 5

- 4 A rectangle $PQRS$ is drawn inside a circle, with its vertices on the circumference of the circle.



[diagram not to scale]

The ratio of the length of PQ to the length of QR is $2 : 1$

The area of the rectangle $PQRS$ is 96 cm^2 .

What is the radius, in cm, of the circle?

- A $\sqrt{6}$
- B 3
- C $3\sqrt{2}$
- D $2\sqrt{15}$
- E $4\sqrt{6}$
- F 12
- G $12\sqrt{2}$
- H $8\sqrt{15}$

- 5** The expected number of bottles of water sold in a day at a sports ground is directly proportional to the square of the average outside temperature, in degrees Celsius, for that day.

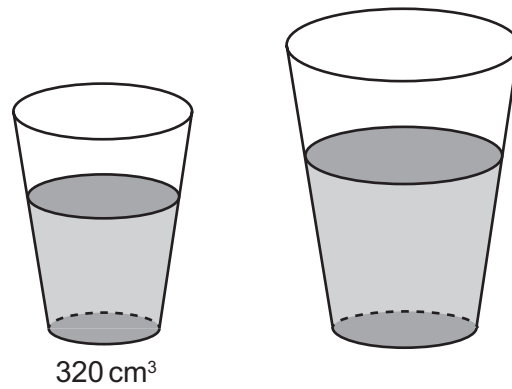
On a day when the average outside temperature is 16°C , 64 bottles of water, the expected number, are sold.

On a warmer day, when the average outside temperature is $T^{\circ}\text{C}$, 256 bottles of water are sold, which is 31 bottles more than the expected number for that day.

What is the value of T ?

- A** 7.5
- B** $\sqrt{450}$
- C** 30
- D** 32
- E** $\sqrt{1148}$
- F** 56.25

6



[diagram not to scale]

At a cinema, drinks are sold in regular and large sizes.

The cups for these are mathematically similar.

The ratio of the heights of the cups and the ratio of the depths of the drinks are both 4 : 5

The volume of drink in a regular size cup is 320 cm^3 .

What is the volume, in cm^3 , of drink in a large size cup?

- A** 384
- B** 400
- C** 500
- D** 576
- E** 625
- F** 640

- 7 The mean of n numbers is p

The mean of two of these numbers is q

The mean of the remaining numbers is 10

Which of the following is a correct expression for n in terms of p and q ?

A $\frac{2(q-10)}{(p-10)}$

B $\frac{2(q-10)}{(10-p)}$

C $\frac{2(q-10)}{(p+10)}$

D $\frac{2(10-q)}{(p+10)}$

E $\frac{2(10+q)}{(p-10)}$

F $\frac{2(10+q)}{(10-p)}$

- 8 The straight lines

$$5x + 2y = 20$$

$$y = 3x - 23$$

$$x = 0$$

enclose a region with area K square units.

What is the value of K ?

A 39

B 78

C 99

D 129

E 198

F 258

- 9** A scale model of a cylindrical pillar is to be made.

The full-sized pillar has a volume of $12\pi \text{ m}^3$.

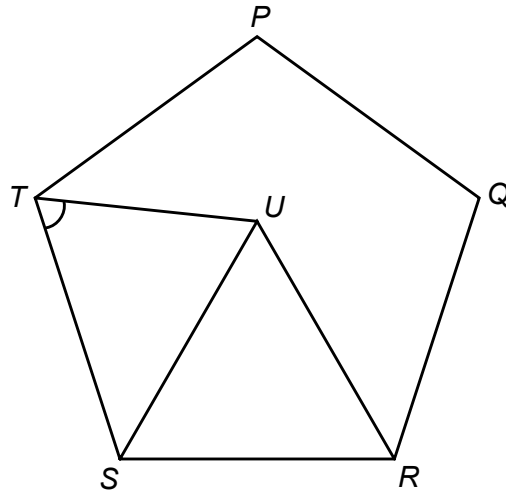
The model will use a length scale of 1 : 40

The model is to be a solid cylinder made of a plastic which has a density of $\frac{4}{3} \text{ g cm}^{-3}$.

What is the mass of the model in grams?

- A** $\frac{9}{640}\pi$
- B** $\frac{1}{40}\pi$
- C** 40π
- D** $\frac{1125}{8}\pi$
- E** 250π
- F** $10\,000\pi$
- G** $225\,000\pi$
- H** $400\,000\pi$

10



[diagram not to scale]

$PQRST$ is a regular pentagon.

RSU is an equilateral triangle.

What is the size of angle STU ?

- A** 48°
- B** 54°
- C** 60°
- D** 66°
- E** 84°

- 11 The original price of an item is p

The price is **increased by** 125%

The increased price is then **decreased by** 40% to q

The relationship between p and q can be expressed as $mp = q$

What is the value of m ?

A $\frac{7}{20}$

B $\frac{17}{20}$

C $\frac{27}{20}$

D $\frac{33}{20}$

E $\frac{37}{20}$

- 12 80% of a number is equal to two-thirds of a second number.

The whole number ratio of the first number to the second number in its lowest terms is $x:y$

What is the value of $x - y$?

A 7

B 2

C 1

D 0.2

E -0.2

F -1

G -2

H -7

- 13 Q is 5 km away from P on a bearing of 065°

R is 5 km away from Q on a bearing of 155°

What is the bearing of P from R ?

- A 070°
- B 110°
- C 225°
- D 270°
- E 290°
- F 315°
- G 335°

- 14 With school lunch, students can select tomato sauce, or mayonnaise, or both, or neither.

n students selected both.

$3n + 1$ students selected tomato sauce.

$3n - 1$ students selected **only** mayonnaise.

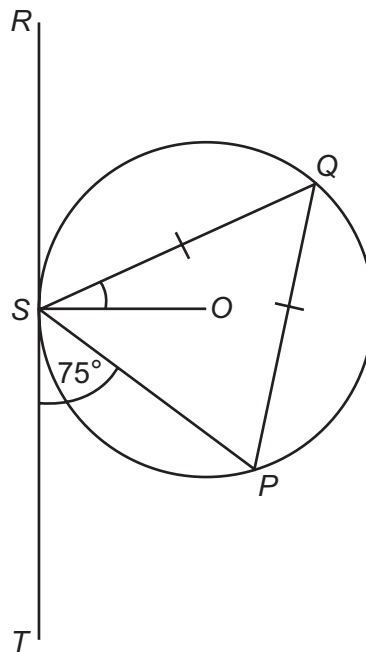
There were $7n + 5$ students in the group.

The probability of a student, chosen at random, selecting **only** mayonnaise is $\frac{1}{3}$

By finding n , what is the probability of a student, chosen at random, selecting **only** tomato sauce?

- A $\frac{3}{11}$
- B $\frac{7}{26}$
- C $\frac{13}{33}$
- D $\frac{3}{8}$
- E $\frac{7}{13}$

15



[diagram not to scale]

The line segment RT is a tangent at the point S to a circle with centre O

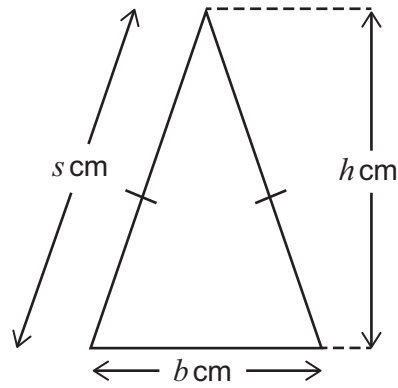
Q and P are points on the circumference of the circle such that $QS = QP$

Angle $PST = 75^\circ$

What is the size of angle QSO ?

- A** 15°
- B** 30°
- C** 37.5°
- D** 45°
- E** 52.5°
- F** 60°
- G** 67.5°
- H** 75°

16



[diagram not to scale]

The vertical height $h \text{ cm}$ of an isosceles triangle is 3 cm longer than the base length of $b \text{ cm}$.

The sloping side is of length $s \text{ cm}$.

The area of the triangle is 14 cm^2 .

There is one value of s which satisfies these conditions.

Within which range does this value of s lie?

- A** $5 < s < 6$
- B** $6 < s < 7$
- C** $7 < s < 8$
- D** $8 < s < 9$
- E** $9 < s < 10$
- F** $10 < s < 11$

- 17 The first five terms of a sequence in order are:

2 17 42 77 122

The n^{th} term of this sequence is $pn^2 + q$ where p and q are integers.

What is the value of $\frac{p-q}{p+q}$?

- A $\frac{1}{4}$
- B $\frac{1}{2}$
- C 1
- D $\frac{23}{17}$
- E $\frac{13}{7}$
- F 2
- G 4
- H 14

- 18 A bag contains 6 red and 6 green sweets. The sweets are identical apart from their colour.

A child takes a sweet at random from the bag.

If the sweet is red, the child stops taking sweets.

If the sweet is green, it is not replaced and the child takes another sweet.

This continues until a red sweet is taken at which point the child stops taking sweets.

What is the probability that the child takes **more** green sweets than red sweets?

A $\frac{3}{22}$

B $\frac{5}{22}$

C $\frac{3}{11}$

D $\frac{1}{2}$

E $\frac{8}{11}$

F $\frac{17}{22}$