A1

How many minutes were there from 19:20 on Monday 9 January 2019, to 20:19 on Tuesday 10 January 2019?

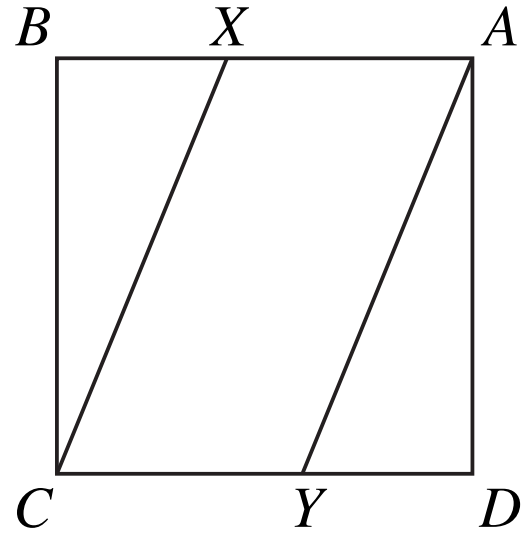
ANSWER: minutes

A2

The diagram shows a square $ABCD$, of side 15 cm, dissected by straight lines XC and AY.

X divides BA in the ratio 2:3.

Y divides CD in the ratio 3:2.



What is the area of the parallelogram $AXCY$?

ANSWER: _____ cm^2

A3

An interior angle from a pentagon is added to an interior angle from another regular polygon. The sum of these two angles is 243°.

How many sides do the two polygons have, in total?

ANSWER:

A4

By rearranging the four digits of 2019, what is the sum of all the numbers that can be formed that lie between 2500 and 9100?

ANSWER:

A5

A saucepan holds 1.2 litres of cheese sauce.

Mary has a ladle with a capacity of 130 ml.

How many full ladles can she remove from the saucepan?

ANSWER: ladles

A6

Model train carriages come in two lengths. First class carriages are 30 cm long. Second class carriages are 20 cm long.

You may select any number of first class and second class carriages, provided that when they are connected to make a train (where the order does not matter), their total length is less than 1 m. You must select at least one carriage.

How many distinct selections are possible?

ANSWER:

A7

2019 has four factors.

What is their median?

ANSWER:

A8

John and his Dad run a phone shop and are arguing about changing the price of a smartphone. John wants to raise the price by 5% whereas his Dad wants to drop the price by 25%. The difference in these proposed new prices would be £48.

How much does the smartphone cost now?

ANSWER: £

A9

This is a multiplication table.
a, b, c and d represent different integers.

	a	b
c	51	57
d	85	95

What is the mean of a, b, c and d?

ANSWER:

A10

What is the answer to this calculation:

$$7 \times 81 + 13 \times 19 + 7 \times 19 + 13 \times 81 \ ?$$

ANSWER:

A11

A trapezium has a height of 5 cm.
One of the parallel sides has a length of 12 cm.
The length of one of the parallel sides is $\frac{2}{3}$ of the length of the other parallel side.

What is the difference in the areas of the two possible trapeziums?

ANSWER: _____ cm^2

A12

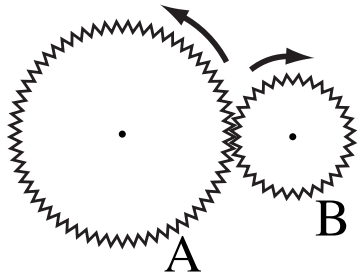
The value of the expression $(p + q)^5$, when $p = 2$ and $q = 4$, is 7776.

What is the value of the expression $(p + q)^5$, when $p = 9$ and $q = 3$?

ANSWER:

A13

The diagram shows two gear wheels, A and B, meshing and rotating.



A completes 5 full rotations in $2\frac{1}{2}$ minutes

B completes 3 full rotations in 20 seconds.

What is the ratio of the number of teeth on A to the number of teeth on B. Give your answer in the form $a : b$ where a and b are positive integers with no common factor other than 1.

ANSWER:

A14

An exam paper has three sections, A, B and C.

Each section has 10 questions.

In section A, questions are worth 10 marks each.
In section B, questions are worth 20 marks each.
In section C, questions are worth 25 marks each.

You may choose any questions provided that:

- The total number of questions does not exceed 10,
- At least four questions are chosen from A,
- There are more questions chosen from B than from C.

What is the maximum possible total score on this exam paper?

ANSWER: _____ marks

A15

A positive integer is included with the numbers 5, 7, 8, 9, 10 to produce a set of six numbers. The mean of the six numbers is now equal to their range.

What was the additional number that was included?

ANSWER:

B1

By rearranging the four digits of 2019, what is the sum of all the even numbers that can be formed that are greater than 9000?

ANSWER:

B2

John is in a race that takes him 30 minutes to complete.
After he has started, his smartwatch reports his heart rate to him every 2 min 20 sec.

How many times does his smartwatch report his heart rate, during the race?

ANSWER:

B3

The rectangular region R, is bounded by the lines $x = 3$, $x = 8$, $y = 4$, and $y = 6$.

How many points, whose coordinates are both integers, lie on the boundary of R?

ANSWER:

B4

How many minutes were there from 20:19 on Friday 13 January 2019 to 19:20 on Saturday 14 January 2019?

ANSWER: minutes

B5

What is the sum of all the numbers in this list that are not divisible by 7:

707, 787, 284, 2842, 1482, 1428 ?

ANSWER:

B6

A set of numbers has a mean of 100 and a range of 100.
Each number in the set is now increased by 2019.

What is the difference between the new range and the new mean?

ANSWER:

B7

All 2019 children at the local school are going on a coach trip to the seaside. Each coach can accommodate 52 passengers. Coaches are full whenever possible.

How many spare seats are there on the coach that is not full?

ANSWER:

B8

The operator '$\diamond$' is defined as follows: $a \diamond b = a + 2ab$

Find the value of x that makes this equation true:

$$(3 \diamond x) + (x \diamond 3) = 94$$

ANSWER:

B9

Soya beans contain 36% protein by weight.
Kidney beans contain 24% protein by weight.
A bean mix consists of 5 kg of soya beans and 7 kg of kidney beans.

What is the percentage of protein, by weight, in this mixture?

ANSWER: ____ %

B10

Five positive integers have mean 7, mode 8 and range 14. One of the integers is 3.

What is the product of the five integers?

ANSWER:

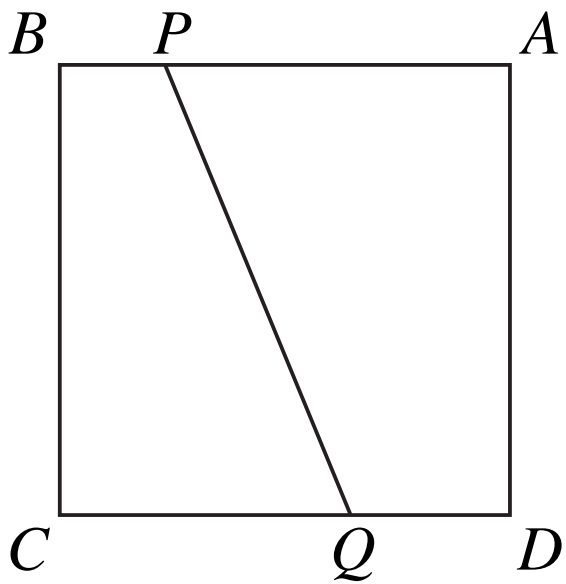
B11

The diagram shows a square $ABCD$, of side 12 cm.

The square is dissected into two parts by the straight line PQ.

P divides BA in the ratio 1:5.

Q divides CD in the ratio 2:1.

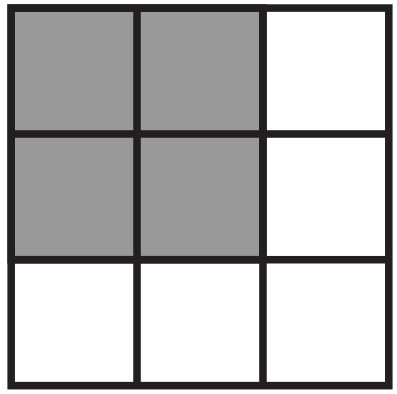


What is the area of the trapezium $APQD$?

ANSWER: _____ cm^2

B12

The digits 1 to 9 are placed in the nine cells of this 3 by 3 array, so that:



the sum of the bottom row is 24,
the sum of the middle row is 6,
the sum of the right-hand column is 18.

What is the sum of the 4 digits in the shaded 2 by 2 square?

ANSWER:

B13

Four identical regular hexagons are assembled into a figure having two lines of symmetry.
There is no overlap and hexagons are joined along full sides.
Each side measures 4 cm.

What is the median of the perimeters of all the possible figures formed by the four hexagons?

ANSWER: _____ cm

B14

A set of traffic lights follows this cycle:

Green – Amber – Red – Red & Amber (together)

This cycle repeats indefinitely. Each cycle takes 34 seconds.

The Green light is lit for half this time. The Red light is lit for 9 seconds more than the Amber light. The Red and Amber lights are lit together for 15 seconds less than the time that the Green light is lit.

How long is the Red light lit during each cycle?

ANSWER: _____ seconds

B15

Sanjeev has 9 black beads and 5 white beads.
There are two trays, one square and one circular.
Sanjeev's teacher has challenged him to put the beads in the trays satisfying all of these conditions:

- All the beads must be used,
- Both trays must contain both black and white beads,
- There must be more black beads than white beads in both trays.

In how many different ways can Sanjeev carry out this task?

ANSWER: