United Kingdom Mathematics Trust

Intermediate Mathematical Challenge

Questions by Topic: 2003 – 2024 Collection

www.CasperYC.club

Last updated: October 27, 2024

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Editors: Lily 王

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Comments and suggestions to DrYuFromShanghai@QQ.com

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
1	C	B	A	D	E	D	E	C	D	E	B	D	B	B	D	A	A	B	D	B	B	A	B	B	D	D	1
2	B	A	E	D	D	E	D	B	C	C	D	A	A	D	B	D	E	D	B	B	E	E	A	A	A	A	2
3	D	E	A	C	A	E	A	D	E	B	C	E	E	E	E	E	E	B	A	C	D	B	C	B	B	A	3
4	E	C	E	B	C	C	B	E	E	B	A	A	E	C	D	C	C	E	D	D	B	D	A	D	D	D	4
5	D	C	C	E	E	B	C	B	D	D	D	E	C	D	E	E	B	A	B	B	D	D	D	C	B	C	5
6	A	B	D	C	D	B	D	A	A	B	A	C	B	A	E	E	D	C	D	A	B	C	E	D	E	C	6
7	E	D	C	B	C	D	B	D	B	D	C	D	A	C	A	B	E	C	C	B	B	B	C	E	B	B	7
8	D	C	A	D	D	D	A	C	B	A	A	B	E	A	D	C	B	E	D	A	E	E	B	A	E	C	8
9	E	B	D	B	E	E	D	D	B	D	B	C	A	B	A	A	B	C	B	E	C	E	D	E	B	D	9
10	D	D	B	C	C	E	C	B	C	C	D	C	E	D	C	B	C	E	A	E	B	B	D	C	D	B	10
11	D	D	B	D	B	A	C	C	A	E	E	B	E	C	C	C	D	D	E	B	C	E	E	E	B	C	11
12	A	E	E	A	B	A	B	D	A	C	D	D	D	B	D	D	D	D	D	E	C	B	E	A	E	D	12
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14	E	D	D	E	A	B	C	D	A	B	E	C	E	A	D	B	C	D	B	C	C	A	B	D	C	B	14
15	C	C	C	D	E	D	A	A	D	A	B	E	A	E	B	E	C	A	C	E	A	A	D	E	A	B	15
16	E	A	B	C	C	C	B	B	D	D	B	E	C	B	A	C	D	B	D	C	A	E	E	D	A	D	16
17	C	D	C	B	A	B	C	E	C	D	D	A	C	E	D	D	D	B	B	D	D	E	D	C	C	E	17
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19	C	C	E	A	B	D	C	B	E	E	E	B	B	A	E	C	A	B	E	D	E	B	A	A	E	A	19
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23	E	B	B	E	A	C	E	B	C	E	C	B	A	C	A	A	B	B	D	A	A	A	B	E	D	B	23
24	A	A	D	C	B	A	A	C	D	C	C	B	C	D	B	A	E	C	C	B	C	A	B	B	C	C	24
25	B	A	D	B	A	B	B	D	E	E	E	D	D	B	D	E	D	D	A	D	D	A	E	C	D	E	25
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	

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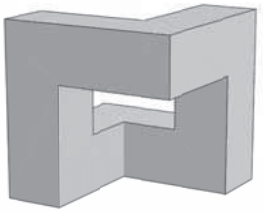
1 3D shapes

Q1 : 2008-Q12 www.CasperYC.club/ukmtnav

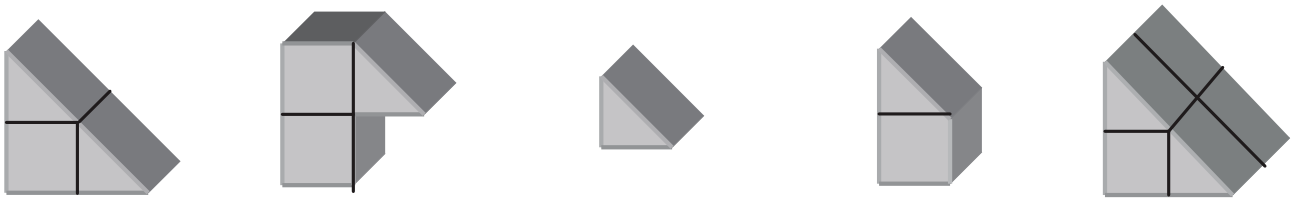
The sculpture 'Cubo Vazado' [Emptied Cube] by the Brazilian artist Franz Weissmann is formed by removing cubical blocks from a solid cube to leave the symmetrical shape shown. If all the edges have length 1, 2 or 3 units, what is the surface area of the sculpture in square units?



A 36 B 42 C 48 D 54 E 60

Q2 : 2008-Q6 www.CasperYC.club/ukmtnav

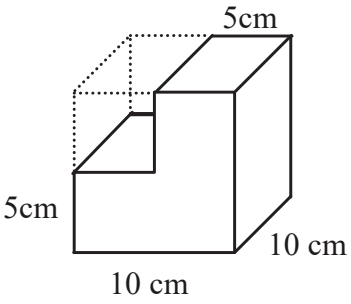
Four of these shapes can be placed together to make a cube. Which is the odd one out?



A B C D E

Q3 : 2010-Q12 www.CasperYC.club/ukmtnav

A cuboid is cut away from a cube of side 10 cm as shown.
By what fraction does the total surface area of the solid decrease as a result?



A $\frac{1}{4}$ B $\frac{1}{6}$ C $\frac{1}{10}$ D $\frac{1}{12}$ E $\frac{1}{18}$

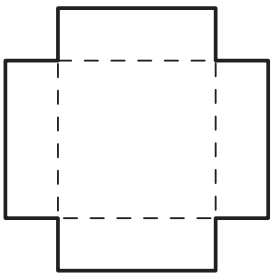
Q4 : 2010-Q19 www.CasperYC.club/ukmtnav

A snail is at one corner of the top face of a cube with side length 1 m. The snail can crawl at a speed of 1 m per hour. What proportion of the cube's surface is made up of points which the snail could reach within one hour?

A $\frac{\pi}{16}$ B $\frac{\pi}{8}$ C $\frac{1}{4}$ D $\frac{1}{2}$ E $\frac{\sqrt{3}}{4}$

Q5 : 2011-Q8 www.CasperYC.club/ukmtnav

A square piece of card has a square of side 2 cm cut out from each of its corners. The remaining card is then folded along the dotted lines shown to form an open box whose total internal surface area is 180 cm^2.

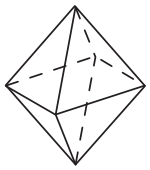


What is the volume of the open box in cm^3?

A 100 B 128 C 162 D 180 E 200

Q6 : 2013-Q7 www.CasperYC.club/ukmtnav

The faces of a regular octahedron are to be painted so that no two faces which have an edge in common are painted in the same colour. What is the smallest number of colours required?



A 2 B 3 C 4 D 6 E 8

Q7 : 2015-Q17 www.CasperYC.club/ukmtnav

The football shown is made by sewing together 12 black pentagonal panels and 20 white hexagonal panels. There is a join wherever two panels meet along an edge.

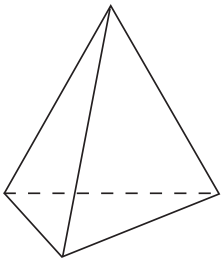
How many joins are there?

A 20 B 32 C 60 D 90 E 180

Q8 : 2015-Q7 www.CasperYC.club/ukmtnav

A tetrahedron is a solid figure which has four faces, all of which are triangles.

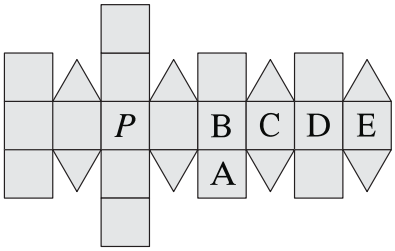
What is the product of the number of edges and the number of vertices of the tetrahedron?

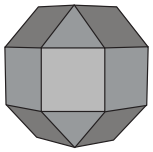


A 8 B 10 C 12 D 18 E 24

Q9 : 2016-Q11 www.CasperYC.club/ukmtnav

The net shown consists of squares and equilateral triangles. The net is folded to form a rhombicuboctahedron, as shown.





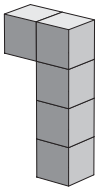
When the face marked *P* is placed face down on a table, which face will be facing up?

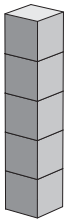
A B C D E

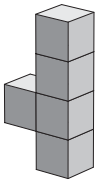
Q10 : 2019-Q2 www.CasperYC.club/ukmtnav

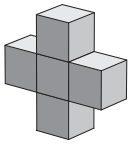
Each of the five shapes shown below is made from five unit cubes.

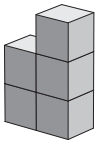
Which has the smallest surface area?

A 

B 

C 

D 

E 

2 Algebraic

Q11 : 2003-Q23 www.CasperYC.club/ukmtnav

Given that it takes a men b hours to paint c square metres of the Forth Bridge, how long would it take d men to paint e square metres of the bridge?

A $\frac{abe}{cd}$ B $\frac{abd}{ce}$ C $\frac{abc}{de}$ D $\frac{acd}{be}$ E $\frac{ace}{bd}$

Q12 : 2003-Q4 www.CasperYC.club/ukmtnav

The coach of the Irish hockey team has a maximum speed of 60 miles per hour. If it travels at this speed for two hours, roughly how many kilometres does it travel?

A 120 B 160 C 200 D 240 E 280

Q13 : 2003-Q7 www.CasperYC.club/ukmtnav

Last year a newspaper reported that Turkish football team Sarigol Municipality transferred four of its players in return for a fee of 225 sacks of cement, needed to repair their stadium. At the same rate of exchange, how many sacks of cement would be the transfer fee for a full team of eleven players and one reserve?

A 233 B 450 C 675 D 900 E 2700

Q14 : 2003-Q9 www.CasperYC.club/ukmtnav

It has been estimated that the mass of insects caught by spiders in a year in the UK is equal to the mass of the human population of the UK. Assuming this population is 60 million and the average mass of a human is 70 kg, what is the mass, in tonnes, of insects caught by spiders per year in the UK?

A 4.2 B 42 C 4200 D 420 000 E 4 200 000

Q15 : 2004-Q22 www.CasperYC.club/ukmtnav

In a maths exam with N questions, you score m marks for a correct answer to each of the first q questions and $m + 2$ marks for a correct answer to each of the remaining questions. What is the maximum possible score?

A $(m+2)N-2q$ B Nm C $mq+(m+2)q$ D $N(m+1)$ E $Nm+q(m+2)$

Q16 : 2004-Q8 www.CasperYC.club/ukmtnav

In March 2003 Welshman Tony Evans dropped a ball from an aircraft a mile above the Mojave desert to see if it would bounce. The ball was made from 6 million rubber bands, had a circumference of 14 ft 8 in, weighed 2600 pounds and took Mr Evans five years to build. On average, roughly how many rubber bands did he add each day whilst building the ball?

A 3 B 33 C 330 D 3300 E 33 000

Q17 : 2005-Q12 www.CasperYC.club/ukmtnav

One gallon of honey provides enough fuel for a bee to fly about seven million miles. Roughly how many bees could fly one thousand miles if they had ten gallons of honey to share between them?

A 7 000 B 70 000 C 700 000 D 7 000 000 E 70 000 000

Q18 : 2005-Q17 www.CasperYC.club/ukmtnav

Platinum is a very rare metal, even rarer than gold. Its density is 21.45 g/cm^3. Assuming that the world production has been about 110 tonnes for each of the past 50 years, and negligible before that, which of the following has a comparable volume to that of the total amount of platinum ever produced?

A a shoe box B a cupboard C a house D Buckingham Palace E the Grand Canyon

Q19 : 2005-Q4 www.CasperYC.club/ukmtnav

Which of the following expressions is equal to 2005?

A $(1^2+1)(10^2+1)$ B $(2^2+1)(20^2+1)$ C $(3^2+1)(30^2+1)$ D $(4^2+1)(40^2+1)$ E $(5^2+1)(50^2+1)$

Q20 : 2006-Q10 www.CasperYC.club/ukmtnav

Gill is 18 this year. She and I went to a restaurant for lunch to celebrate her birthday. The bill for lunch for the two of us came to £25.50. Gill paid the bill by credit card and I left a £2.50 tip in cash. We agreed to split the total cost equally. How much did I owe Gill?

A £11 B £11.50 C £12 D £12.50 E £13

Q21 : 2006-Q17 www.CasperYC.club/ukmtnav

Last year, on the television programme *Antiques Roadshow*, a painting was said to be worth £15 000 although the painting had originally cost only 50p. As a percentage of the original price, what would be the approximate profit if the painting were to be sold for £15 000?

A 15 000 % B 30 000 % C 300 000 % D 1 500 000 % E 3 000 000 %

Q22 : 2006-Q6 www.CasperYC.club/ukmtnav

Harriet Hare and Turbo Tortoise want to cross the finish line together on their 12 mile woodland race. Turbo sets off at 8:15 am and trots at a constant speed of 4 mph. Given that Harriet runs at a constant speed of 8 mph, at what time should she set off?

A 9:45 am B 10:15 am C 10:45 am D 11:15 am E 11:45 pm

Q23 : 2007-Q1 www.CasperYC.club/ukmtnav

At midnight on 15 December 2005, the moon reached its highest point in the sky, an event which occurs every 18.6 years. In which year will it next occur?

A 2007 B 2008 C 2023 D 2024 E 2191

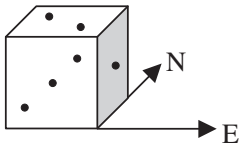
Q24 : 2007-Q14 www.CasperYC.club/ukmtnav

If p is a positive integer and q is a negative integer, which of the following is greatest?

A $p-q$ B $q-p$ C $p+q$ D $-p-q$ E More information needed

Q25 : 2007-Q22 www.CasperYC.club/ukmtnav

The diagram shows an ordinary die in which the scores on opposite faces always total 7. It is placed on a horizontal table with the '1' face facing East. The die is moved four times, rotating it each time through 90° about an edge. The faces in contact with the table are first 1, then 2, then 3, then 5. In which direction is the '1' face facing after this sequence of moves?



A West B East C North D South E Up

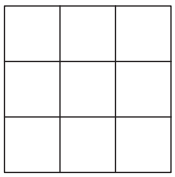
Q26 : 2007-Q4 www.CasperYC.club/ukmtnav

Between them, Ginger and Victoria eat two thirds of a cake. If Ginger eats one quarter of the cake, what fraction of the cake does Victoria eat?

A $\frac{1}{2}$ B $\frac{2}{5}$ C $\frac{3}{8}$ D $\frac{4}{9}$ E $\frac{5}{12}$

Q27 : 2023-Q6 www.CasperYC.club/ukmtnav

To draw a 3 by 3 square grid you need 8 straight lines, as shown.



How many straight lines do you need to draw a n by n square grid?

A $n+5$ B $3n-1$ C n^2-1 D $4(n-1)$ E $2(n+1)$

Q28 : 2023-Q19 www.CasperYC.club/ukmtnav

What is the positive difference between the numerator and the denominator when the expression shown is written as a single fraction in its simplest form?

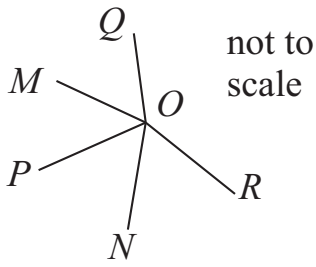
$$\frac{n}{n+1-\dfrac{n+2}{n+3}}$$

A $2n+2$ B $n+2$ C n D 2 E 1

3 Angles

Q29 : 2003-Q14 www.CasperYC.club/ukmtnav

In the diagram, $\angle MON = 130°$. The reflection of OP in OM is OQ and the reflection of OP in ON is OR. What is the size of $\angle QOR$?



A 100° B 120° C 140° D 150° E 160°

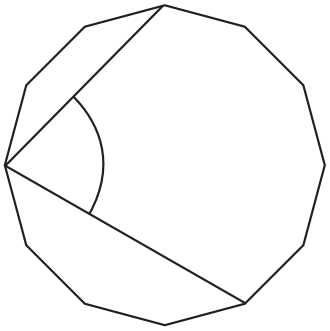
Q30 : 2003-Q15 www.CasperYC.club/ukmtnav

Each interior angle of a particular polygon is an obtuse angle which is a whole number of degrees. What is the greatest number of sides the polygon could have?

A 90 B 179 C 180 D 359 E 360

Q31 : 2003-Q22 www.CasperYC.club/ukmtnav

The diagram shows a regular dodecagon (a polygon with twelve equal sides and equal angles). What is the size of the marked angle?

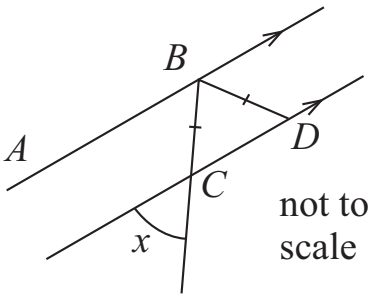


A 67.5° B 72° C 75° D 82.5° E 85°

Q32 : 2003-Q8 www.CasperYC.club/ukmtnav

Lines AB and CD are parallel and $BC = BD$. Given that x is an acute angle not equal to 60°, how many *other* angles in this diagram are equal to x?

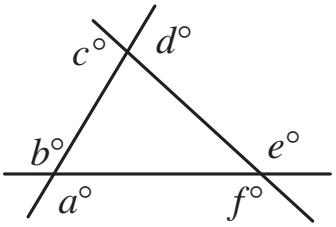
A 1 B 2 C 3 D 4 E 5



Q33 : 2004-Q4 www.CasperYC.club/ukmtnav

What is the value of $a + b + c + d + e + f$?

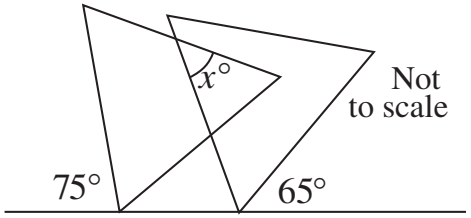
A 360 B 540 C 720 D 900
E it depends on the triangle



Q34 : 2005-Q13 www.CasperYC.club/ukmtnav

The diagram shows two equilateral triangles.
What is the value of x?

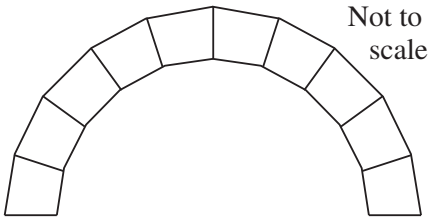
A 70 B 60 C 50 D 40 E 30



Q35 : 2005-Q14 www.CasperYC.club/ukmtnav

Ten stones, of identical shape and size, are used to make an arch, as shown in the diagram. Each stone has a cross-section in the shape of a trapezium with three equal sides. What is the size of the smallest angles of the trapezium?

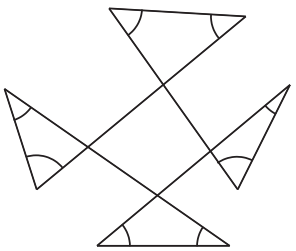
A 72° B 75° C 81° D 83° E 85°



Q36 : 2005-Q7 www.CasperYC.club/ukmtnav

In the diagram, what is the sum of the marked angles?

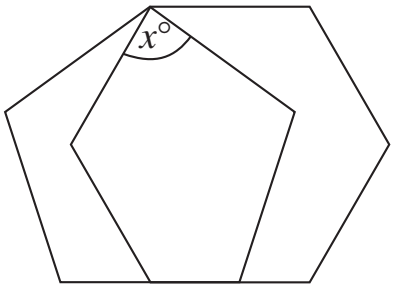
A 180° B 360° C 450° D 540° E 720°



Q37 : 2006-Q19 www.CasperYC.club/ukmtnav

The diagram shows a regular pentagon and a regular hexagon which overlap. What is the value of x ?

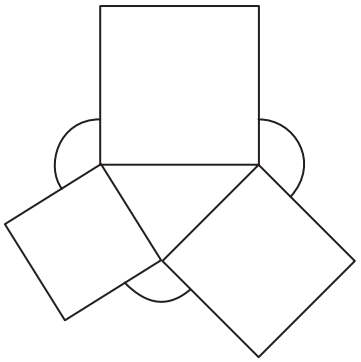
A 82 B 84 C 85 D 87 E 91



Q38 : 2007-Q10 www.CasperYC.club/ukmtnav

The diagram shows three squares drawn on the sides of a triangle. What is the sum of the three marked angles?

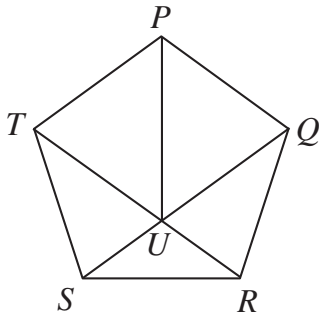
A 180° B 270° C 360°
D 450° E It depends on the shape of the triangle



Q39 : 2007-Q15 www.CasperYC.club/ukmtnav

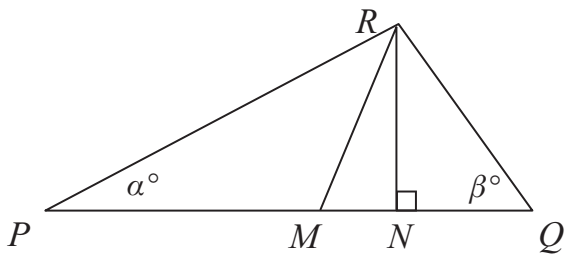
The diagram shows a regular pentagon $PQRST$. The lines QS and RT meet at U. What is the size of angle PUR?

A 108° B 112° C 116° D 126° E 132°



Q40 : 2008-Q21 www.CasperYC.club/ukmtnav

In triangle PQR, $\angle QPR = \alpha°$ and $\angle PQR = \beta°$, where $\alpha < \beta$. The line RM bisects $\angle PRQ$ and RN is the perpendicular from R to the line PQ. What is the size, in degrees, of $\angle MRN$?

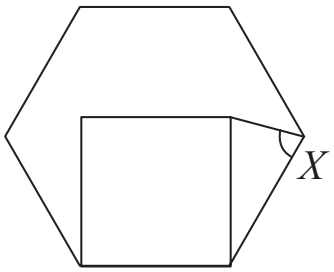


A $\frac{180-(\alpha+\beta)}{2}$ B $\frac{\beta-\alpha}{2}$ C $\frac{\alpha+2\beta}{2}$ D $\frac{360-\alpha-2\beta}{2}$ E $\frac{\alpha+\beta}{2}$

Q41 : 2009-Q12 www.CasperYC.club/ukmtnav

The diagram shows a square inside a regular hexagon. What is the size of the marked angle at X?

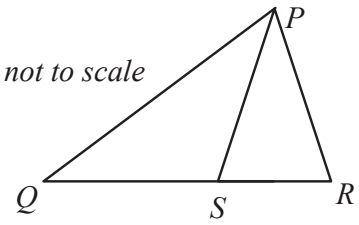
A 45° B 50° C 60° D 75° E 80°



Q42 : 2009-Q17 www.CasperYC.club/ukmtnav

PQR is a triangle and S is a point on QR.
$QP = QR = 9$ cm and $PR = PS = 6$ cm.
What is the length of SR?

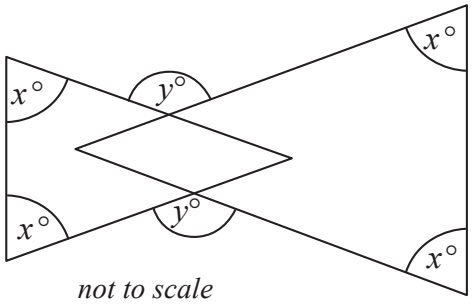
A 1cm B 2cm C 3cm D 4cm E 5cm



Q43 : 2009-Q4 www.CasperYC.club/ukmtnav

The diagram shows two isosceles triangles, in which the four angles marked $x°$ are equal. The two angles marked $y°$ are also equal. Which of the following is always true?

A $y = 2x$ B $y = x + 30$ C $y = x + 60$
D $y = x + 90$ E $y = 180 - x$



Q44 : 2010-Q2 www.CasperYC.club/ukmtnav

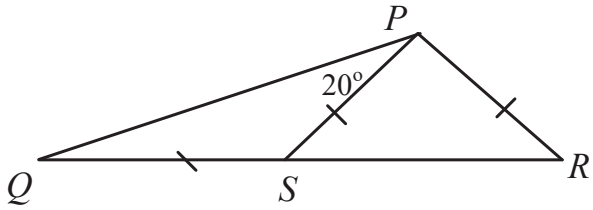
Three of the interior angles of a given quadrilateral are each 80°. What is the fourth angle of this quadrilateral?

A 120° B 110° C 100° D 90° E 80°

Q45 : 2010-Q6 www.CasperYC.club/ukmtnav

In triangle PQR, S is a point on QR such that $QS = SP = PR$ and $\angle QPS = 20°$. What is the size of $\angle PRS$?

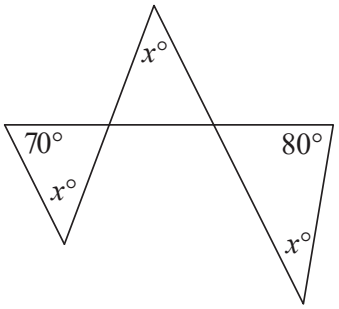
A 20° B 35° C 40°
D 55° E 60°



Q46 : 2011-Q7 www.CasperYC.club/ukmtnav

What is the value of x in this diagram?

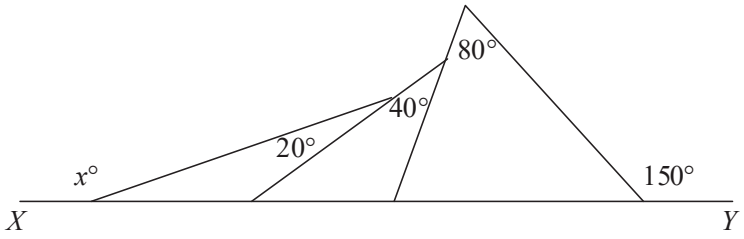
A 30 B 35 C 40 D 45 E 50



Q47 : 2011-Q9 www.CasperYC.club/ukmtnav

In the diagram, XY is a straight line.
What is the value of x?

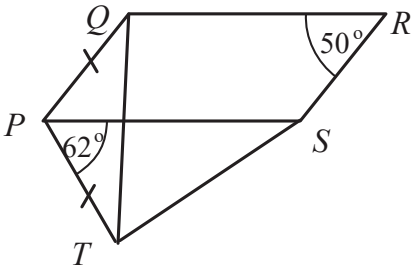
A 170 B 160 C 150
D 140 E 130



Q48 : 2012-Q11 www.CasperYC.club/ukmtnav

In the diagram, $PQRS$ is a parallelogram; $\angle QRS = 50°$; $\angle SPT = 62°$ and $PQ = PT$.
What is the size of $\angle TQR$?

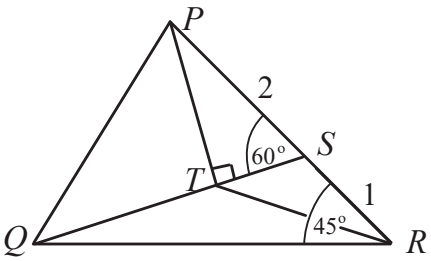
A 84° B 90° C 96° D 112° E 124°



Q49 : 2012-Q23 www.CasperYC.club/ukmtnav

In triangle PQR, $PS = 2$; $SR = 1$; $\angle PRQ = 45°$; T is the foot of the perpendicular from P to QS and $\angle PST = 60°$.
What is the size of $\angle QPR$?

A 45° B 60° C 75° D 90° E 105°



Q50 : 2012-Q3 www.CasperYC.club/ukmtnav

An equilateral triangle, a square and a pentagon all have the same side length. The triangle is drawn on and above the top edge of the square and the pentagon is drawn on and below the bottom edge of the square. What is the sum of the interior angles of the resulting polygon?

A $10 \times 180°$ B $9 \times 180°$ C $8 \times 180°$ D $7 \times 180°$ E $6 \times 180°$

Q51 : 2013-Q10 www.CasperYC.club/ukmtnav

ABCDE is a regular pentagon and *BCF* is an equilateral triangle such that *F* is inside *ABCDE*.

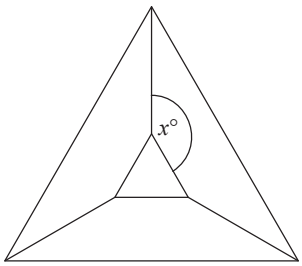
What is the size of $\angle FAB$?

A 48° B 63° C 66° D 69° E 72°

Q52 : 2014-Q3 www.CasperYC.club/ukmtnav

An equilateral triangle is placed inside a larger equilateral triangle so that the diagram has three lines of symmetry.

What is the value of x?

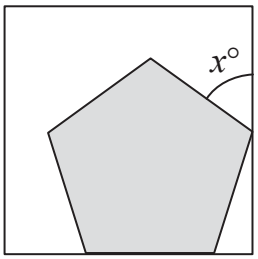


A 100 B 110 C 120 D 130 E 150

Q53 : 2015-Q4 www.CasperYC.club/ukmtnav

The diagram shows a regular pentagon inside a square.

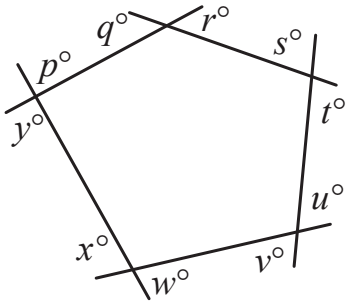
What is the value of x ?



A 48 B 51 C 54 D 60 E 72

Q54 : 2015-Q9 www.CasperYC.club/ukmtnav

What is the value of $p + q + r + s + t + u + v + w + x + y$ in the diagram?



A 540 B 720 C 900 D 1080 E 1440

Q55 : 2016-Q10 www.CasperYC.club/ukmtnav

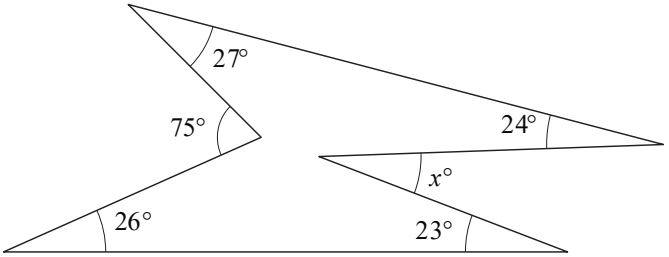
The angles of a quadrilateral taken in order are $x°$, $5x°$, $2x°$ and $4x°$. Which of the following is the quadrilateral?

A kite B parallelogram C rhombus D arrowhead E trapezium

Q56 : 2016-Q7 www.CasperYC.club/ukmtnav

In the diagram, what is the value of x?

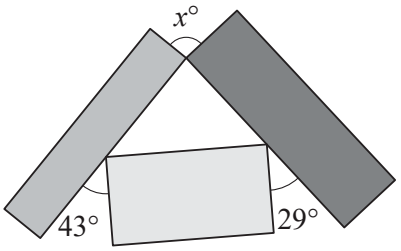
A 23 B 24 C 25 D 26 E 27



Q57 : 2017-Q10 www.CasperYC.club/ukmtnav

The diagram shows three rectangles.
What is the value of x?

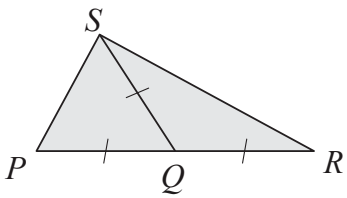
A 108 B 104 C 100 D 96 E 92



Q58 : 2017-Q15 www.CasperYC.club/ukmtnav

In the diagram shown, $PQ = SQ = QR$ and $\angle SPQ = 2 \times \angle RSQ$.
What is the size of angle QRS?

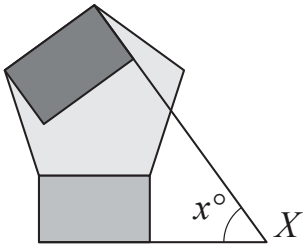
A 20° B 25° C 30° D 35° E 40°



Q59 : 2017-Q17 www.CasperYC.club/ukmtnav

The diagram shows two rectangles and a regular pentagon. One side of each rectangle has been extended to meet at X.
What is the value of x?

A 52 B 54 C 56 D 58 E 60



Q60 : 2017-Q6 www.CasperYC.club/ukmtnav

The angles of a quadrilateral are in the ratio 3 : 4 : 5 : 6.

What is the difference between the largest angle and the smallest angle?

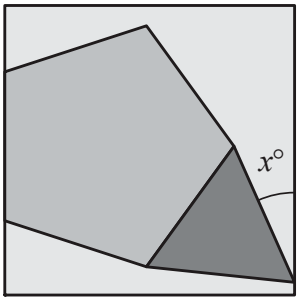
A 30° B 40° C 50° D 60° E 70°

Q61 : 2018-Q18 www.CasperYC.club/ukmtnav

The diagram shows a regular pentagon and an equilateral triangle placed inside a square.

What is the value of x?

A 24 B 26 C 28 D 30 E 32

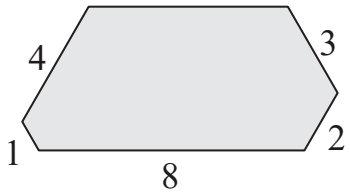


Q62 : 2018-Q23 www.CasperYC.club/ukmtnav

The diagram shows a hexagon. All the interior angles of the hexagon are 120°. The lengths of some of the sides are indicated.

What is the area of the hexagon?

A $20\sqrt{3}$ B $21\sqrt{3}$ C $22\sqrt{3}$ D $23\sqrt{3}$ E $24\sqrt{3}$

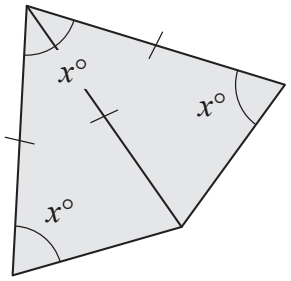


Q63 : 2018-Q4 www.CasperYC.club/ukmtnav

A kite is made by joining two congruent isosceles triangles, as shown.

What is the value of x?

A 36 B 54 C 60 D 72 E 80

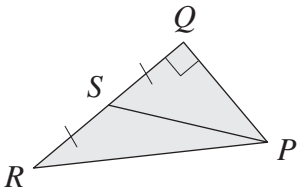


Q64 : 2019-Q21 www.CasperYC.club/ukmtnav

The diagram shows a right-angled triangle PQR. The point S is the midpoint of the side QR and $\tan \angle QPR = \frac{3}{2}$.

What is the value of $\sin \angle QPS$?

A $\frac{1}{\sqrt{3}}$ B $\frac{1}{\sqrt{2}}$ C $\frac{1}{2}$ D $\frac{3}{5}$ E $\frac{4}{5}$

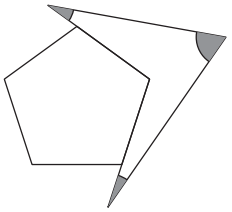


Q65 : 2020-Q22 www.CasperYC.club/ukmtnav

The diagram shows a regular pentagon and an irregular quadrilateral.

What is the sum of the three marked angles?

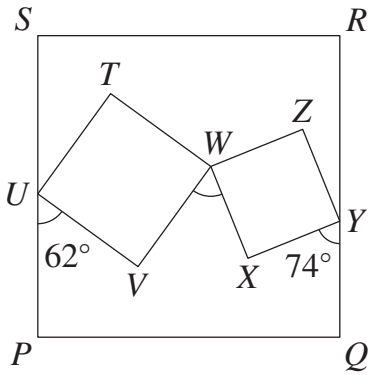
A 72° B 90° C 108° D 126° E 144°



Q66 : 2021-Q4 www.CasperYC.club/ukmtnav

The diagram shows three squares, $PQRS$, $TUVW$ and $WXYZ$.
Angles PUV and QYX are 62° and 74° respectively.
What is angle VWX?

A 44° B 48° C 60° D 64° E 68°

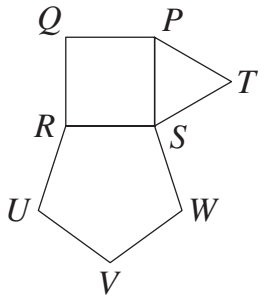


Q67 : 2023-Q12 www.CasperYC.club/ukmtnav

In the diagram, $PQRS$ is a square, PST is an equilateral triangle and $SRUVW$ is a regular pentagon.

What is the size of angle WTS?

A 35° B 36° C 37° D 38° E 39°



4 Averages

Q68 : 2004-Q10 www.CasperYC.club/ukmtnav

What is the mean of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{6}$?

A $\frac{1}{5}$ B $\frac{1}{15}$ C $\frac{5}{12}$ D $\frac{7}{24}$ E $\frac{5}{16}$

Q69 : 2005-Q6 www.CasperYC.club/ukmtnav

A shop advertises 'Buy one, get one at half price'. For this offer, the average cost per item is the same as:

A Two for the price of one B Three for the price of one C Three for the price of two
D Four for the price of three E Five for the price of four

Q70 : 2006-Q4 www.CasperYC.club/ukmtnav

The mean, median and mode of the numbers in the boxes below are the same. What is the missing number?

7	7	5	7	?

A 6.5 B 7 C 8 D 8.5 E 9

Q71 : 2007-Q6 www.CasperYC.club/ukmtnav

The sum of 9 consecutive positive whole numbers is 2007. What is the difference between the largest and smallest of these numbers?

A 8 B 9 C 10 D 18 E 223

Q72 : 2008-Q13 www.CasperYC.club/ukmtnav

The mean of a sequence of 64 numbers is 64. The mean of the first 36 numbers is 36. What is the mean of the last 28 numbers?

A 28 B 44 C 72 D 100 E 108

Q73 : 2008-Q16 www.CasperYC.club/ukmtnav

The first two terms of a sequence are $\frac{2}{3}$ and $\frac{4}{5}$. Each term after the second term is the average (mean) of the two previous terms. What is the fifth term in the sequence?

A $\frac{5}{34}$ B $\frac{1}{2}$ C $\frac{10}{13}$ D $\frac{3}{4}$ E $\frac{10}{11}$

Q74 : 2012-Q13 www.CasperYC.club/ukmtnav

Alex Erlich and Paneth Farcas shared an opening rally of 2 hours and 12 minutes during their table tennis match at the 1936 World Games. Each player hit around 45 shots per minute. Which of the following is closest to the total number of shots played in the rally?

A 200 B 2000 C 8000 D 12 000 E 20 000

Q75 : 2012-Q14 www.CasperYC.club/ukmtnav

What value of x makes the mean of the first three numbers in this list equal to the mean of the last four?

15 5 x 7 9 17

A 19 B 21 C 24 D 25 E 27

Q76 : 2013-Q5 www.CasperYC.club/ukmtnav

The northern wheatear is a small bird weighing less than an ounce. Some northern wheatears migrate from sub-Saharan Africa to their Arctic breeding grounds, travelling almost 15 000 km. The journey takes just over 7 weeks. Roughly how far do they travel each day, on average?

A 1 km B 9 km C 30 km D 90 km E 300 km

Q77 : 2014-Q14 www.CasperYC.club/ukmtnav

This year the *Tour de France* starts in Leeds on 5 July. Last year, the total length of the *Tour* was 3404 km and the winner, Chris Froome, took a total time of 83 hours 56 minutes 40 seconds to cover this distance. Which of these is closest to his average speed over the whole event?

A 32 km/h B 40 km/h C 48 km/h D 56 km/h E 64 km/h

Q78 : 2014-Q9 www.CasperYC.club/ukmtnav

At the age of twenty-six, Gill has passed her driving test and bought a car. Her car uses p litres of petrol per 100 km travelled. How many litres of petrol would be required for a journey of d km?

A $\frac{pd}{100}$ B $\frac{100p}{d}$ C $\frac{100d}{p}$ D $\frac{100}{pd}$ E $\frac{p}{100d}$

Q79 : 2015-Q11 www.CasperYC.club/ukmtnav

Three different positive integers have a mean of 7. What is the largest positive integer that could be one of them?

A 15 B 16 C 17 D 18 E 19

Q80 : 2015-Q14 www.CasperYC.club/ukmtnav

In a sequence, each term after the first two terms is the mean of all the terms which come before that term. The first term is 8 and the tenth term is 26. What is the second term?

A 17 B 18 C 44 D 52 E 68

Q81 : 2015-Q18 www.CasperYC.club/ukmtnav

The total weight of a box, 20 plates and 30 cups is 4.8 kg. The total weight of the box, 40 plates and 50 cups is 8.4 kg. What is the total weight of the box, 10 plates and 20 cups?

A 3 kg B 3.2 kg C 3.6 kg D 4 kg E 4.2 kg

Q82 : 2015-Q2 www.CasperYC.club/ukmtnav

Last year, Australian Suzy Walsham won the annual women's race up the 1576 steps of the Empire State Building in New York for a record fifth time. Her winning time was 11 minutes 57 seconds. Approximately how many steps did she climb per minute?

A 13 B 20 C 80 D 100 E 130

Q83 : 2016-Q14 www.CasperYC.club/ukmtnav

Tegwen has the same number of brothers as she has sisters. Each one of her brothers has 50% more sisters than brothers.

How many children are in Tegwen's family?

A 5 B 7 C 9 D 11 E 13

Q84 : 2016-Q19 www.CasperYC.club/ukmtnav

A list of positive integers has a median of 8, a mode of 9 and a mean of 10.

What is the smallest possible number of integers in the list?

A 5 B 6 C 7 D 8 E 9

Q85 : 2016-Q24 www.CasperYC.club/ukmtnav

Every day, Aimee goes up an escalator on her journey to work. If she stands still, it takes her 60 seconds to travel from the bottom to the top. One day the escalator was broken so she had to walk up it. This took her 90 seconds.

How many seconds would it take her to travel up the escalator if she walked up at the same speed as before while it was working?

A 30 B 32 C 36 D 45 E 75

Q86 : 2016-Q5 www.CasperYC.club/ukmtnav

When travelling from London to Edinburgh by train, you pass a sign saying 'Edinburgh 200 miles'. Then, $3\frac{1}{2}$ miles later, you pass another sign saying 'Half way between London and Edinburgh'.

How many miles is it by train from London to Edinburgh?

A 393 B $396\frac{1}{2}$ C 400 D $403\frac{1}{2}$ E 407

Q87 : 2016-Q9 www.CasperYC.club/ukmtnav

The world's fastest tortoise is acknowledged to be a leopard tortoise from County Durham called Bertie. In July 2014, Bertie sprinted along a 5.5 m long track in an astonishing 19.6 seconds.

What was Bertie's approximate average speed in km per hour?

A 0.1 B 0.5 C 1 D 5 E 10

Q88 : 2017-Q12 www.CasperYC.club/ukmtnav

The combined age of Alice and Bob is 39. The combined age of Bob and Clare is 40. The combined age of Clare and Dan is 38. The combined age of Dan and Eve is 44. The total of all five ages is 105.

Which of the five is the youngest?

A Alice B Bob C Clare D Dan E Eve

Q89 : 2017-Q7 www.CasperYC.club/ukmtnav

Four different positive integers are to be chosen so that they have a mean of 2017.

What is the smallest possible range of the chosen integers?

A 2 B 3 C 4 D 5 E 6

Q90 : 2018-Q24 www.CasperYC.club/ukmtnav

A list of 5 positive integers has mean 5, mode 5, median 5 and range 5.

How many such lists of 5 positive integers are there?

A 1 B 2 C 3 D 4 E 5

Q91 : 2018-Q3 www.CasperYC.club/ukmtnav

In September 2016 a polymer £5 note was introduced. The Bank of England issued 440 million of them.

What is the total face value of all these notes?

A £220 000 000 B £440 000 000 C £2 200 000 000 D £4 400 000 000 E £22 000 000 000

Q92 : 2018-Q5 www.CasperYC.club/ukmtnav

The adult human body has 206 bones. Each foot has 26 bones.

Approximately what fraction of the number of bones in the human body is found in one foot?

A $\frac{1}{6}$ B $\frac{1}{8}$ C $\frac{1}{10}$ D $\frac{1}{12}$ E $\frac{1}{20}$

Q93 : 2019-Q13 www.CasperYC.club/ukmtnav

Megan writes down a list of five numbers. The mean of her first three numbers is -3. The mean of her first four numbers is 4. The mean of her first five numbers is -5.

What is the difference between her fourth number and her fifth number?

A 66 B 55 C 44 D 33 E 22

Q94 : 2021-Q24 www.CasperYC.club/ukmtnav

Sam writes on a white board the positive integers from 1 to 6 inclusive, once each. She then writes p additional fives and q sevens on the board. The mean of all the numbers on the board is then 5.3. What is the smallest possible value of q?

A 7 B 9 C 11 D 13 E 15

Q95 : 2022-Q3 www.CasperYC.club/ukmtnav

In the Caribbean, loggerhead turtles lay three million eggs in twenty thousand nests. On average, how many eggs are in each nest?

A 15 B 150 C 1500 D 15 000 E 150 000

Q96 : 2022-Q20 www.CasperYC.club/ukmtnav

Aroon is asked to choose five integers so that the mode is 2 more than the median and the mean is 2 less than the median. What is the largest possible value of the range of Aroon's five integers?

A 2 B 5 C 12 D 15
E The largest possible range depends on the integers chosen

Q97 : 2023-Q9 www.CasperYC.club/ukmtnav

Merryn wrote down the numbers 2, 0, 2, 3 and one further number. What was the median of her five numbers?

A 0 B 2 C 2.5 D 3
E more information required

Q98 : 2023-Q13 www.CasperYC.club/ukmtnav

The mean of p and q is 13; the mean of q and r is 16; the mean of r and p is 7. What is the mean of p, q and r?

A 12 B 13 C 14 D 15 E 16

Q99 : 2024-Q5 www.CasperYC.club/ukmtnav

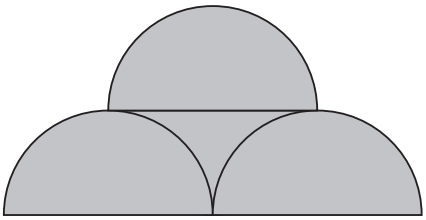
The ages of Grannie's seven grandchildren are consecutive positive integers. The youngest three grandchildren have a mean age of 6. What is the mean age of the oldest three grandchildren?

A 8 B 9 C 10 D 11 E 12

5 Circles

Q100 : 2003-Q17 www.CasperYC.club/ukmtnav

The diagram shows three semicircles, each of radius one. What is the size of the total shaded area?

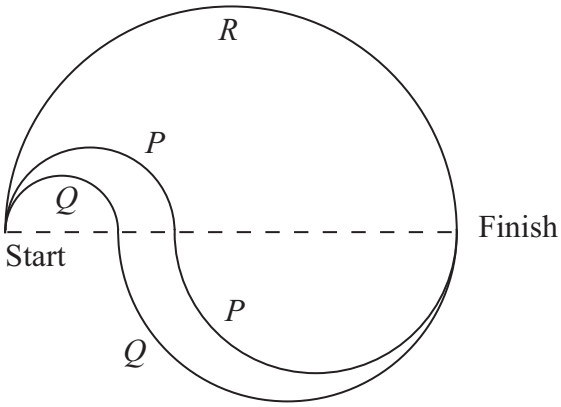


A $\pi + 2$ B 5 C $\frac{3}{2}\pi + 1$
D 4 E $2\pi - 1$

Q101 : 2003-Q21 www.CasperYC.club/ukmtnav

In a leisure park there are three running tracks, all with the same Start and Finish, and all made from either one or two semicircles with centres on the same line.

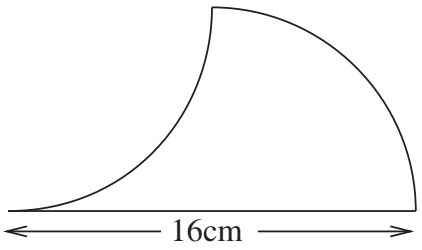
Three runners P, Q and R start together at the Start and run at the same constant speed along the tracks as shown. In what order do they reach the Finish?



A P then Q then R B R first then P and Q together C R then Q then P
D all three together E more information needed

Q102 : 2004-Q12 www.CasperYC.club/ukmtnav

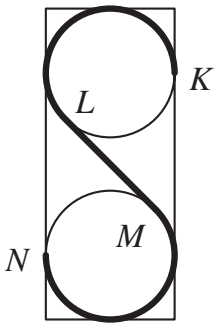
This figure is made from a straight line 16 cm long and two quarter circles, one with its centre at the midpoint of the straight line. What is the area of the figure (in cm^2) ?



A 64 B 16π C $32 + 16\pi$
D 32π E $16 + 8\pi$

Q103 : 2004-Q23 www.CasperYC.club/ukmtnav

In the diagram, the letter S is made from two arcs, KL and MN, which are each five-eighths of the circumference of a circle of radius 1, and the line segment LM, which is tangent to both circles. At points K and N, common tangents to the two circles touch one of the circles. What is the length LM?



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