

Distrikt Final

Part 1. Time: **60 min – 6 questions** Max points: **18** (3p/question).

Allowed tools: Paper, pencil and rubber only.

Write on separate paper. One sheet per question.

Full working is required for part 1.

1. Enrique's mushrooms

Malmö Borgarskola's chef, Enrique, is about to cook his favourite Beef Stroganoff. He buys 2 kg of mushrooms, which consist of 99% water. He leaves the mushrooms out to dry in the Malmö sunshine and some of the water is evaporated. Now the mushrooms consist only of 95% water.

How much do the mushrooms weigh in total now?

2. Unit fractions

The ancient Egyptians wrote their fractions as a sum of unit fractions – that is fractions with a one on the top.

Split the fraction $\frac{25}{42}$ into a sum of unit fractions:

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$$

where a, b, and c, have to be different whole numbers.

3. 7:an

Which pairs of whole numbers a and b satisfy the following :

$$(a - 1) \cdot (b + 2) = 7$$

4. Zero product

How many zeros are there at the end of the product $1 \cdot 2 \cdot 3 \cdot 4 \cdot \dots \cdot 75$?

5. The Duke of Tuscany Problem

Three fair dice are thrown and the three scores are added together.

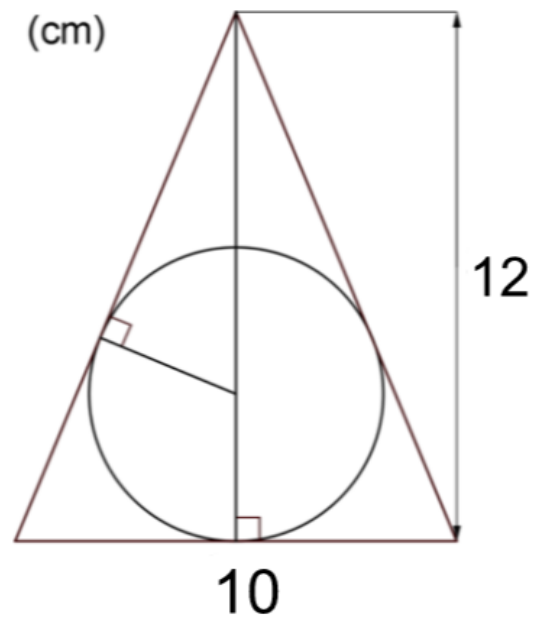
Is the probability of getting a total score of 9, greater than, less than, or the same as getting a total score of 10?

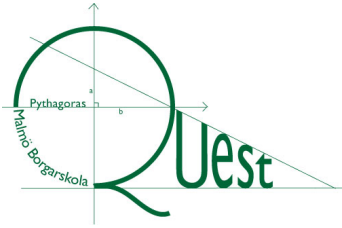
Pick the correct answer and show working to back up your answer.

6. Circle in a squeeze

A circle is inscribed in an isosceles triangle as in the figure below.

Find the radius of the circle. Answer as a fraction and simplify as much as possible.





PYTHAGORAS QUEST



Handelskammaren
I sydsvenska företags intresse

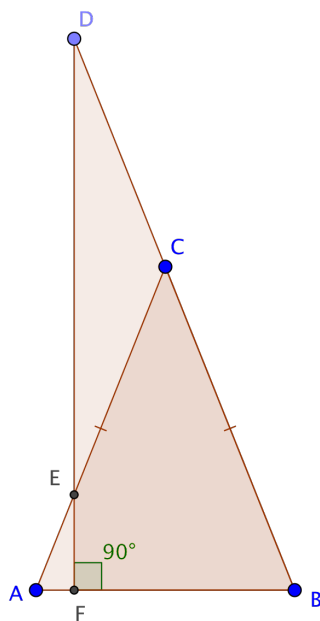
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Part 2. Time : 30 min – 7 questions Max points: **14 points** (2p/points).

Allowed tools: pencil, paper and rubber only.

Only your answer is needed for Part 2. Write your team's answers on a single sheet with your team name on.

1. The Triangle Problem



ABC is an isosceles triangle in with $AC = BC$.
EF is perpendicular to AB and is extended to meet BC at D.

If angle BAC is 70° , what are the interior angles in triangle CDE?

2. The Long Formula

Given the following formula

$$y = 10x^3 + 9x^2 - 2x - 1$$

Calculate y given that $x = -\frac{1}{5}$? Simplify your answer as much as possible.

3. Monster Sum

What is $-1 + 2 - 3 + 4 - 5 + 6 - \dots + 1000$?

4. Three coin tosses

You toss a fair coin three times.

What is the probability that you get at least two tails in a row? Answer as a fraction.

5. Easy as pqr ?

If $3^p + 3^4 = 90$ and $2^q + 44 = 76$ and also $6^r + 5^3 = 341$ what is the product pqr ?

6. Trip to Cern

Of all the pupils at Malmö Borgarskola, there are as many boys as there are girls.

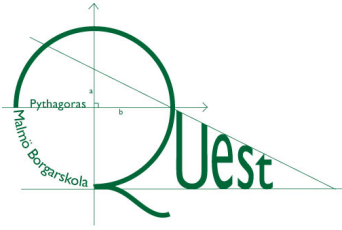
Some of the pupils went on a trip to the particle accelerator CERN. Two thirds of all the school's girls went on the trip as did three quarters of all the school's boys.

Of all those who went on the trip, what fraction were girls?

7. Bike trip

Malte rides on a flat road at 20 kilometers per hour (km/h), downhill at 30 km/h, and uphill at 5 km/h. Malte rides on a flat road at 30 km/h, downhill at 40 km/h, and uphill at 10 km/h. Malte goes from town A to town B, a distance of 10 km all uphill, then from town B to town C, a distance of 15 km all downhill, and then back to town A, a distance of 20 km on the flat. Lars goes the other way around using the same route.

How many more minutes does it take Malte to complete the 45-km ride than it takes Lars?



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Part 3 Time: max 20 min

Decider Question

Allowed tools: Paper, pencil and rubber only

If two or more teams have the same total points from Parts 1 and 2 then the decider question is used. Firstly we look for the correct answer, then we look to the team who has solved it in the shortest amount of time.

There are 2017 beads on a pearl necklace. The beads follow a regular pattern (see below).

(start) Red-Blue-Green-White-Black-Yellow-Red-Blue-Green-White-Black-Yellow- ...

Which bead comes in 2017th place??