

Instructions – Part I

Time	90 minutes for Part I. It is recommended that you use a maximum of 45 minutes for working with the part where calculator is not allowed. You may not use your calculator until you have submitted your answers to this part.
Aids	Part where calculator is not allowed: Approved formula page and ruler. Question 14: Calculator, approved formula page and ruler.
The part without calculator	This part consists of questions to be solved without a calculator. Two of the questions require that you explain your solution. Present your solutions in the figure and the box nearby the question. The rest of the questions require only the answer. After each question the maximum number of points available for your answer/solution is shown.
Question 14	This question is a larger question, which normally requires more time. In the box below the question you can see what considerations the teacher will make in assessing your solution.
Grading	The test (part I + part II) gives a total maximum of 58 points, of which 28 are vg-points. <i>Lower limits for examination grade</i> Pass: 18 points Pass with distinction: 35 points of which at least 12 vg-points Pass with special distinction: At least 21 vg-points. In addition you must demonstrate several of the MVG-qualities that are possible to show in the questions marked ■.

Name: _____

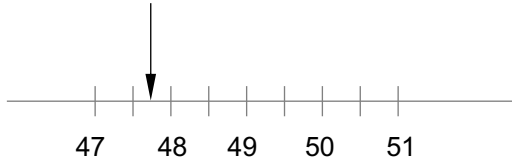
Date of birth: _____

Adult education/Secondary school program: _____

Name:..... Class/Group:.....

Part I

1. What number is the arrow pointing at?



Answer: _____

(1/0)

2. Draw an altitude (height) for this triangle.
Mark it clearly.



(1/0)

3. On a windy day it feels colder than what the thermometer shows.
It may not sound very cold if it is -10°C and there is a “moderate wind”.
But if “moderate wind” means a wind speed of 7 m/s , what will the chilling effect be?

Chilling effect with wind						
$^{\circ}\text{C}$	2 m/s	7 m/s	11 m/s	16 m/s	20 m/s	Wind speed
0	-2	-11	-16	-18	-19	
-5	-7	-17	-23	-26	-28	
-10	-12	-25	-31	-34	-36	
-15	-17	-32	-38	-42	-43	
-20	-23	-38	-46	-49	-52	
-25	-28	-45	-53	-57	-59	

Source: Naturvårdsverket, Fjällsäkerhetsrådet

Answer: _____ $^{\circ}\text{C}$

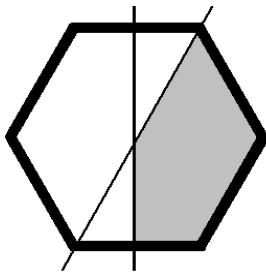
(1/0)

4. What number should be written in the box for equality to hold?

$$0.15 + \boxed{} + 0.24 = 3.00$$

Answer: _____ (1/0)

5. The figure is a regular hexagon. Each of the two extra lines divides the hexagon into two equal parts. How much of the hexagon is shaded? Answer in fractional form.

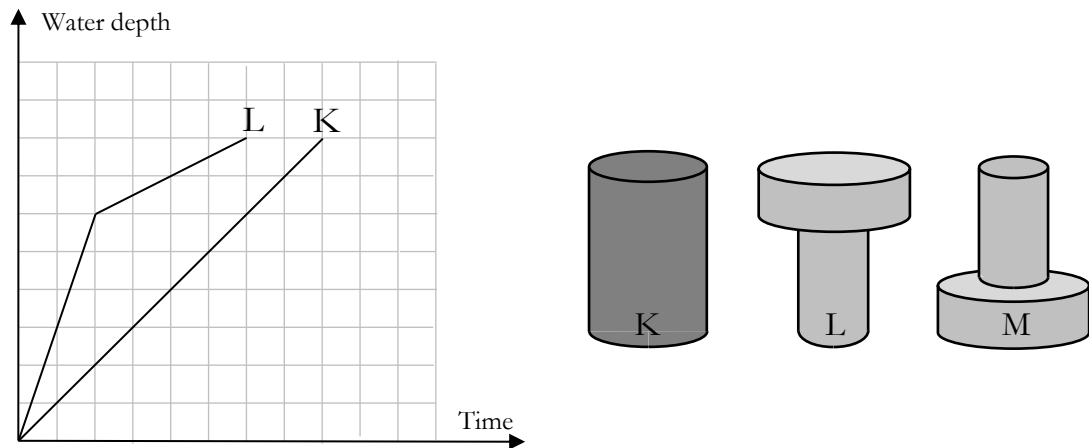


Answer: _____ (1/0)

6. Solve the equation $158 = 2x - 7.2$
Show your solution in the space below.

Answer: $x =$ _____ (2/0)

7. The containers K, L and M, all with the same height, were filled with water at a constant rate. The graphs show how the depth of the water increased for containers K and L.



- a) Why does the water rise faster in container L than in container K at the start? Explain your answer in the space below.

(1/0)

- b) Draw the corresponding graph for container M in the system of co-ordinates above.

(1/1)

8. Calculate $\frac{10.38 + 10.38 + 10.38 + 10.38}{10.38 + 10.38}$

Answer: _____

(0/1)

Continue

9. On a map in scale 1:50 000, it is 8 cm between two places. How far is this in reality? Answer in kilometres.

Answer: _____ km (0/1)

10. Adam buys a used moped.
The formula $y = 10000 \cdot 0.8^x$ describes the moped's value y kronor after x year. How much is the annual depreciation percentage?

Answer: _____ % per year (0/1)

11. Stina runs 3 kilometres in 18 minutes. What is her average speed in km/h?

Answer: _____ km/h (0/1)

12. What value must x have for equality to hold?
 $2 \cdot 10^3 \cdot 10^2 \cdot x = 10^7$

Answer: $x =$ _____ (0/1)

13. What number is missing in the empty box in the table?

x	xy	xy^2
2	10	

Answer: $xy^2 =$ _____ (0/1)

Question 14 – The Ant’s Walk

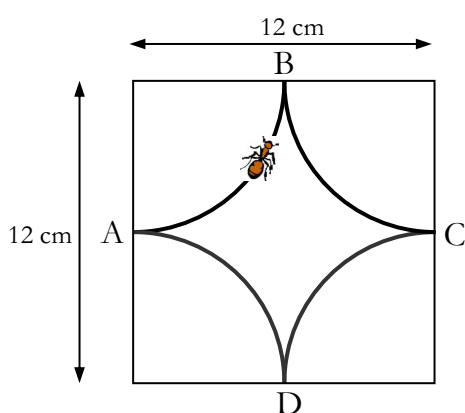


Figure 1

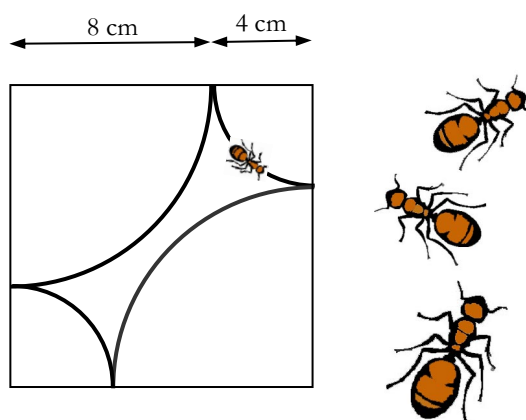


Figure 2

- I. Four circular arcs with the same radius are drawn inside a square with side length 12 cm (see figure 1). The centers for these circular arcs are the vertices of the square. An ant walks along these circular arcs. It starts at A and walks to B, then to C and D and then to A. How far has the ant walked?
- II. In another square with side length 12 cm, four other circular arcs are drawn, two with radius 4 cm and two with radius 8 cm (see figure 2). The ant takes a walk along all of these four circular arcs. Show that this walk is the same length as the walk the ant took in figure 1.
- III. The radii of such circular arcs, in a square with side length 12 cm, can have many different values. Show that the ant’s walk will always have the same length.
- IV. If the ant is not allowed to cross its own path, the radii of the circular arcs may not have any arbitrary values. Investigate what radii are possible in this case.

(4/5) 

In assessing your work the teacher will take into consideration

- what mathematical knowledge you have shown and how well you have carried out the task
- how well you have explained your reasoning and defended your conclusions
- how well you have presented your written solution.