

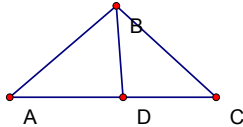


ECIS Mathematics League 2005

Bernoulli's League (suggested age 14 -16) No Calculators

Section 1 – 40 minutes (6questions)

1. If $\overline{AD} = \overline{BD}$ and $\overline{DB} = \overline{DC}$ then find the size of $\angle ABC$



2. What does $1 - 2 + 3 - 4 + 5 - 6 + \dots + 97 - 98 + 99$ equal to?
3. A book that I am reading has 720 pages. The day I borrowed it I read exactly half. The next day I read one third of what was left. On the day after that I read one quarter of what remained. What fraction of the book now remains unread?
4. Five years ago Jo's mother was four times Jo's age. Now Jo's mother is three times her age. How old is Jo now?
5. An A is awarded to students who score 90% or more on a test with 70 questions. How many points does a student score who is one point too low for an A?
6. A Ferris wheel has cabins that trace a circle of diameter of 26 metres. If the centre of the Ferris wheel is 15 metres above the ground, does the wheel touch the ground? If not, how close to the ground does the wheel pass?



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Section 2 – 40 minutes (6questions)

1. A regular hexagon just fits inside a circle of diameter **6 cm**. What is the perimeter of the hexagon?
2. A circle of radius 10cm has its radius decreased by 3cm.
Find the shaded area as a percent of the original



3. What is the units digit of 19^{90} ?
4. What is the angle between the hands of a clock at **2:30 am**?
5. The variables a and b are related by the equation $ab^2 = 4$. If b is doubled, by what is a multiplied?
6. Two consecutive positive odd numbers have a product equal to **195**.
What is their sum?



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Section 3 – 40 minutes (6questions)

1. How many different cardboard triangles can be cut out such that each has sides of length a whole centimeter length and each has perimeter **15cm**?
2. You are allowed to use only the digits **1, 2 and 3** but you may use each digit as often as you like. How many different three-digit numbers is it possible to make?
3. All the even numbers starting from **2** to **98** inclusive, except those ending in 0, are
multiplied together. What is the units digit of the product?
4. The lengths of a triangle are y , $y + 2$, $y + 4$ and the perimeter is 30cm. Find the length of the shortest side.
5. What is the eighth prime number?
6. A toy car moves at **3m/s for 4 minutes** and then moves at **5 m/s for 2 minutes**. What is its average speed?



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Answers. Out of 18 marks. Each Section maximum 6 marks

Section 1

1. 90° or $\frac{\pi}{2}$
2. 50
3. Quarter or 0.25 or 25%
4. 15 years old
5. 62
6. No, 2 m

Section 2

1. 18cm
2. 51%
3. 1
4. 105° or $\frac{7\pi}{12}$
5. Quarter or 0.25
6. 28 or -28

Section 3

1. 7
2. 27
3. 6
4. 8 cm
5. 19
6. $\frac{11}{3} ms^{-1}$