WESTMINSTER
INTERNATIONAL UNIVERSITY IN TASHKENT
An Accredited Institution of the University of Westminster (UK)

ENTRANCE TEST

LYCEUM OF WESTMINSTER INTERNATIONAL UNIVERSITY IN TASHKENT

MATHEMATICS

JULY 2014
M3

Time allowed: 1 hour 15 minutes

ANSWER ALL QUESTIONS IN DETAIL, SHOWING ALL YOUR WORK.

NO BOOKS, NOTES, CALCULATORS OR ANY SORT OF ASSISTING MATERIAL ARE ALLOWED.

KITOB, DAFTAR, KALKULYATOR YOKI BOSHQA YORDAMCHI MATERIALLARDAN FOYDALANISH TAQIQLANADI.

ПОЛЬЗОВАНИЕ КНИГОЙ, ТЕТРАДЬЮ, КАЛЬКУЛЯТОРОМ ИЛИ ЛЮБЫМ ВСПОМОГАТЕЛЬНЫМ МАТЕРИАЛОМ ЗАПРЕЩАЕТСЯ.

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Question 1. Calculate: $\dfrac{17:4\frac{1}{2}:\frac{8}{27}-6\frac{11}{12}+14.8-7\frac{2}{15}}{17\frac{2}{3}-15\frac{13}{15}}-\left(\dfrac{3.82^3-2.43^3}{1.3+\sqrt{0.0081}}+2.43\times 3.82\right)^{\frac{1}{4}}$

Answer:

Question 2. Simplify as much as possible: $\dfrac{x}{ax-2a^2}+\dfrac{4ax^{-1}-2a}{x^2-2a+x-2ax}\cdot\left(x+\dfrac{6x+3}{x-2}\right):\left(1+3x^{-1}\right)$

Answer:

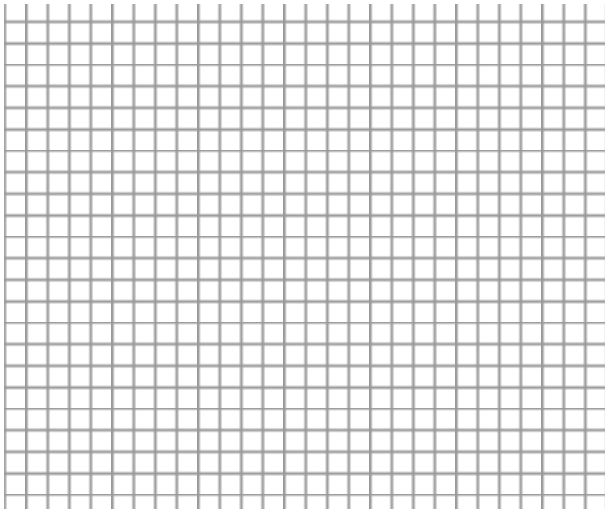
Question 3. Solve the equation: $x \cdot (x-2)^2 \cdot (x-4) = 45$

Answer:

Question 4. If $x - y = 5$ and $\frac{1}{x} - \frac{1}{y} = \frac{10}{7}$, find the value of $x^3 - y^3$.

Answer:

Question 5. An athlete throws a javelin. Its height above the ground after it has travelled a horizontal distance of *x* meters is given by $H(x) = -\frac{1}{60}x^2 + x$. a) Graph *H* against *x*. b) How high is the javelin after it has travelled 20 meters? c) What is the maximum height reached by the javelin? d) How far did the javelin travel before it hit the ground?

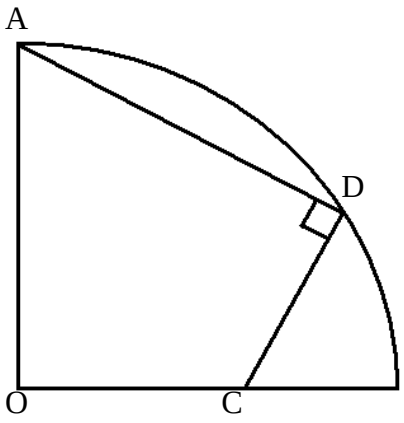


Answer: b) **c)** **d)**

Question 6. At the Grand Canyon, a penny is dropped off the edge of a cliff. The distance the penny falls is 16 feet the first second, 38 feet the next second, 60 feet the third second, and so on. Using **suitable formulae only**, find: a) the distance the penny falls in 10 seconds, and b) how long it takes the penny to travel the distance of 2,550 feet.

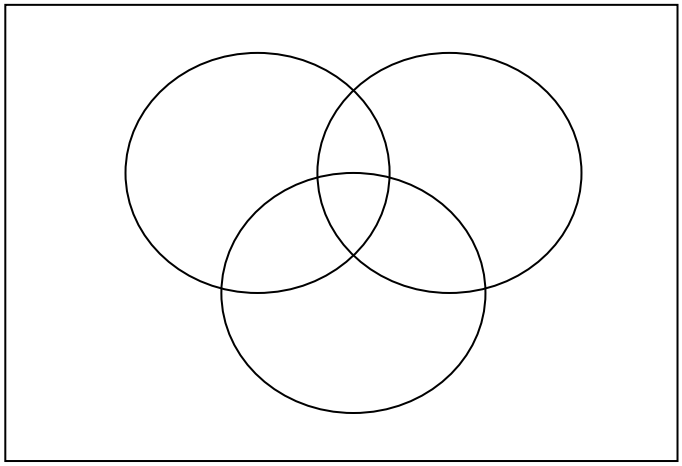
Answer: a) **b)**

Question 7. In the diagram below, D is a point on a quarter circle with center O, $AO = AD = 4$ cm and $\angle ADC = 90°$. Find the length of OC.



Answer:

Question 8. 134 out of 205 families in "Chimgan" village keep cows, 142 keep sheep and 76 keep goats. 67 families have cows and sheep, 10 have cows and goats, 15 have sheep and goats. There are 34 families who keep all three kinds of pets. a) How many families keep only one kind of pet? b) How many have no pets at all? Hint: Use the following diagram.



Answer: a) **b)**

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Question 1. Calculate:

$$\left(\left(22\frac{17}{36}-24\frac{7}{12}\right):\frac{2}{\sqrt[3]{729}}-\frac{3}{26}\cdot\sqrt{169}:\sqrt[5]{243}\right)+\left(\frac{12}{\sqrt{15}-3}-\frac{28}{\sqrt{15}-1}+\sqrt{7-\sqrt{48}}\right)\cdot\left(6+\sqrt{3}\right)$$

Answer:

Question 2. Simplify as much as possible: $\dfrac{a(a+3)(ab-b)-b(a^2-4a)}{a^3-16a}:\dfrac{b-ba^{-3}}{a^2+3a-4}+\dfrac{4a^2}{4-a}$

Answer:

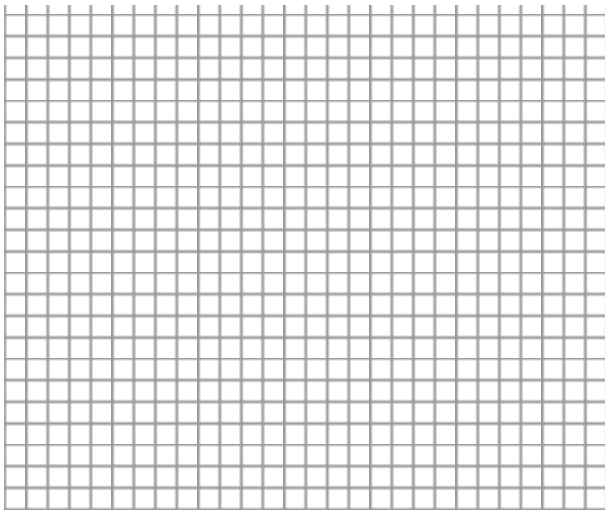
Question 3. Solve the equation: $(3x-2)^3-3(4-12x+9x^2)=4-6x$

Answer:

Question 4. Find the value of $\frac{(m+n)^2}{2k}$ if $m^2-2mn+k^2-2nk+2n^2=0$ and $2mn-k^2=25$

Answer:

Question 5. Draw the graphs of $y = x+1$, $y = x-3$, $y = -x+3$ and $y = -x+7$. Estimate the area of the figure formed by your graphs.

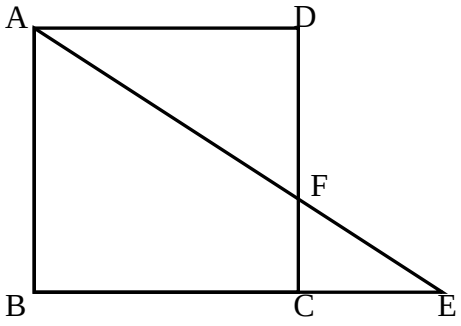


Answer:

Question 6. Matthew's Clothing Shop opened four years ago. The first year he made $3,000 profit. Each year thereafter his profits averaged 10% greater than the previous year. a) How much profit does Matthew earn during his current year of business? b) What will be the expected total amount of profit he earns over his first six years? You **must use suitable formulae** to support your answers.

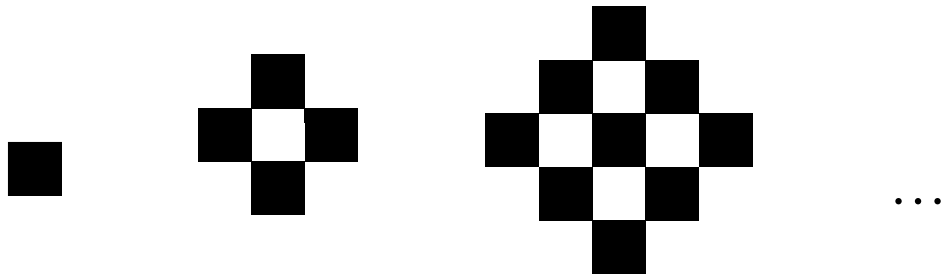
Answer: a) **b)**

Question 7. In the diagram below, *ABCD* is a square. If *BE* = 4 cm and *DF* = 3 cm, estimate the length of *AB.*



Answer:

Question 8. Black and white floor tiles are built in the pattern shown below. a) How many black tiles will be needed to build the 25^{th} figure? b) What about white tiles? You **must give a reason** for your answer.



1 **2** **3** **4**

Answer: a) **b)**