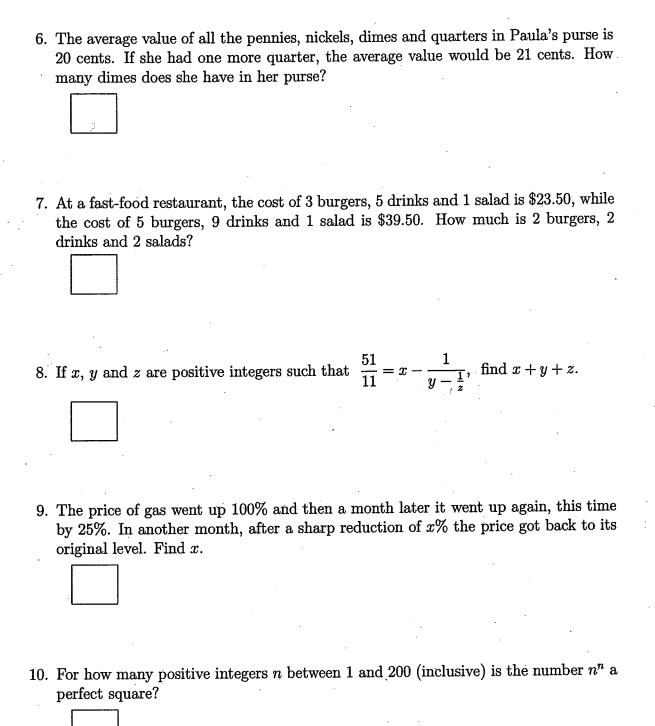
PART I.	Name:
	School:
Answer all questions and write your answ	vers in the boxes provided.
1. A parabola $y = ax^2 + bx + c$ has ver parabola. What is $abc$ ?	tex $(4,2)$ and $(2,0)$ is on the graph of the
2. What is the coefficient of $x^7$ in the poly	ynomial expansion of $(1 + 2x - x^2)^4$ ?
3. What is the value of $\sqrt{\frac{8^{10}+4^{10}}{8^4+4^{11}}}$ ?	
4. We are given that $sin(x) = 3cos(x)$ . We	That is the value of $\sin(x)\cos(x)$ ?
5. On the globe 17 parallels (lines of lati are drawn. Into how many parts do the	itude) and 24 meridians (lines of longitude) ey divide the surface of the globe?



	PART II.	Name:
		School:
•	Answer all	questions by writing your answers in the boxes provided.
11.	If $f(x)$ is a	function such that $2f(1/x) + f(x)/x = x$ for all $x \neq 0$ , find $f(2)$ .
12.	Find $m+n$	, where $m$ and $n$ are relatively prime positive integers such that
		$\frac{m}{n} = \left(1 - \frac{1}{2^2}\right) \left(1 - \frac{1}{3^2}\right) \left(1 - \frac{1}{4^2}\right) \cdot \dots \cdot \left(1 - \frac{1}{24^2}\right).$
13.	Find all pair	rs of positive integers $(x, y)$ such that $x \le y$ and $1/x + 1/y = 1/6$ .
14.	opposite por runner runs Next they r	ob run on a circular track, starting at the same time at diametrically ints of the track. Alice runs clockwise and Bob counterclockwise. Each at a constant speed. They first meet when Alice has run 100 meters. neet when Bob has run 150 meters from their previous meeting place. 1991 of the track (in meters).
15.	Let M and d. If the area of	N be the midpoints of the sides $BC$ and $CD$ of a parallelogram $ABCD$ . If the triangle $AMN$ is 15 cm <sup>2</sup> , find the area of the parallelogram.
16.	The product there?	of the digits of a four-digit number is 90. How many such numbers are
17.	•	rcle of radius 1, find the side length of a square with two vertices on the d two on the arc of the semicircle.

	PART III.	Name:
		School:
	Solve as many problems as you can by very provided and giving FULL WRITTEN EXCation/proof.	writing your final answers in the boxes XPLANATIONS with a complete justifi-
18.	Find the length of the altitude (the shortes face) of the regular tetrahedron (triangular	st distance from a vertex to the opposite pyramid) whose sides are of length 1.

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20. Find a positive integer n such that  $1/n < \sqrt{99} - \sqrt{98} < 1/(n-1)$ .

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21.	The increasing which are eith of this sequence	er powers	1, 3, 4, 9, of 3 or su	10, 12, 13, ims of dis	consi	sts of all the wers of 3.	nose posit Find the	ive integers 100th term
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