1. D The pattern for the y-intercepts is $2n^2$, which gives us 10952 for $n = 74$.
2. B This expression starts with -1 (when $n = 1$) and then goes to 1, which is the opposite of the pattern in the sequence.
3. C The 565th line has a slope of 1 and the 6930th line has a slope of -1. That makes these lines perpendicular, so one of the angles is 90. Each of these lines forms a 45 degree angle with the y-axis, therefore it's a right isosceles triangle.
4. A The midsegment of a triangle is half the length of the parallel side. Therefore, the perimeter would be half that of large triangle.
5. C Rotating (x, y) 90 degrees results in $(-y, x)$
6. D The expression for the measure of an interior angle of a regular polygon is $\frac{180(n-2)}{n}$. If this is equal to 178, then $n = 180$
7. D Because XY ⊥ YZ that means AB ⊥ BC. Also since triangle XYZ is an isosceles triangle that means $YZ = BC = 6$. Also, since ABC is entirely in the first quadrant, C must be $(8, 7)$.
8. D The circumcenter is the point of concurrency between all the perpendicular bisectors. Two of these are $y = 4$ and $x = 5$. Therefore, the coordinates are $(5, 4)$.
9. E Which of the following lines on triangle ABC does not lie on the line $y = -x + 9$?
10. B The line given above is one median. Taking the median from point A as a second gives us the equation $y = 2x - 3$. The point of intersection of these two lines is $(4, 5)$.
11. C Because the inscribed and circumscribed circle have the same center, DEF is equilateral. Because C is an incenter CF is an angle bisector. Therefore CFE must be 30.
12. C Because DEF is equilateral, the circumcenter is also the centroid. This means the distance between it and the vertex (which is also the circumradius) is twice that from it to the opposite side (which is also the inradius). Since the circumradius is 12, the inradius is 6.
13. C From the above we can deduce that the altitude is 18. This means each side is $12\sqrt{3}$, therefore the perimeter is $36\sqrt{3}$.
14. B EIT and EIK are congruent angles, so we can solve for x using the equation $2x + 10 = 3x - 5$, which gives us $x = 15$. This gives us m<EIT = 40 and m<IET = 20. The sum of these gives us the measure of the exterior angle.
15. D RO is twice the length of CD. This allows us to solve for x using the equation: $3x + 4 = 2(x + 3)$. This gives us $x = 2$, which gives us a perimeter of 32.
16. C The first perimeter gives us the length of diagonal OL as 13. Since CD is a midsegment, it splits FP and PL in half. Since the diagonals in a parallelogram also bisect each other this means PD is one fourth of OL, which is 3.25. We can then use the second given perimeter to get $PL = 2.75$. This means the perimeter of OPR is 22 and the perimeter of DPA is 9.
17. C The length of the midsegmet in a trapezoid is the average of the lengths of the bases. This implies that the perimeter of the new parallelogram will be the average of the perimeters of the other two, which is 24.

18. D The perimeter of ABCD is 16. Each successive parallelogram will have half the perimeter of the preceding one. This will produce a geometric sequence given by $32\left(\frac{1}{2}\right)^n$
19. B IE is a perpendicular bisector of KT, creating a 9-12-15 right triangle with KI as the hypotenuse. Using the given perimeter we can find that $KE = 20$. This is the hypotenuse of a 12-16-20 right triangle. Therefore, $IE = 25$
20. C The diagonals of a rhombus are perpendicular bisectors to each other. This creates 4 right triangles with a hypotenuse of 13 and one leg of length 12. The other leg must be of length 5.
21. C Two radii drawn to adjacent vertices of the hexagonal base produce an equilateral triangle of side length 5. If the height of each side is also 5, then the lateral surface area is 150. The apothem of the hexagons is $\frac{5\sqrt{3}}{2}$ and the perimeter is 30, so the area of both together $75\sqrt{3}$. Therefore the total surface area is $75(2+\sqrt{3})$.
22. C The discriminant is $\sqrt{b^2-4ac}$ which must be greater than 0 for there to be two zeroes. Therefore, a and c should be as small as possible (namely 1), and b should be just large enough to make the radicand positive (namely 3).
23. D The powers of i cycle in the following pattern: $i, -1, -i, 1, \ldots$ We can divide the exponents by 4 and the remainder is the place in the pattern. This yields $3+6i$
24. E Rewriting 16 and 8 as powers of 2 and applying rules of exponents we get $2^{x+2} = 2^{3x-18}$, which yields $x = 10$
25. A The right hand side of the equation can be simplified to 1. The power on the left can equal 1 in one of three ways: 1) the exponent is 0, 2) the base is positive 1, 3) the exponent is even and the base is -1. The values, $-7, -3, -2,\ and\ 3$ satisfy these conditions.
26. C $\frac{6!}{2!} = 360$
27. C Two zeroes are already given. The irrational zero also implies the conjugate, $3-\sqrt{7}$, as a zero as well. The last three values on the table imply two zeroes, one that is shown at $x = 3$ and another that is either a repeat at $x = 3$ or occurring before or after. This means f(x) has at least 4 zeroes and so must be at least of degree 4.
28. B Knowing the degree as 4, we can write f(x) in factored form, using c for the unknown zero, as $f(x) = \left(x-\left(3+\sqrt{7}\right)\right)\left(x-\left(3-\sqrt{7}\right)\right)(x-3)(x-c)$. We can then use the fact that $f(1) = -12$ to solve for c, which is 3. Then, the product of the zeroes will equal the y-intercept.
29. D Expanding the factored form yields $f(x) = x^4 - 12x^3 + 47x^2 - 66x + 18$.
30. C From the table, two of the zeroes should be obvious ($x = 2\ and\ 4$). From there we can either use polynomial division on the expanded form to discover the remaining zeroes, which are $x = 3 \pm \sqrt{6}$