Some Triangle Numbers

A positive whole number n is a *triangle number* if it is the area of a right triangle with rational side lengths. Thus n is a triangle number if there are rational numbers a, b, and c with $a^2 + b^2 = c^2$ and $n = ab/2$. The following table lists every $n \leq 40$, whether or not it is a triangle number, and, if so, the side lengths of the triangle, and a solution to the corresponding elliptic curve.

n	Side Lengths	Point on $y^2 = x^3 - n^2 x$
1	–	
2	–	
3	–	
4	–	
5	$a = 20/3,\ b = 3/2,\ c = 41/6$	$(-4, 6)$
6	$a = 3,\ b = 4,\ c = 5$	$(-3, 9)$
7	$a = 24/5,\ b = 35/12,\ c = 337/60$	$(25, 120)$
8	–	
9	–	
10	–	
11	–	
12	–	
13	$a = 323/30,\ b = 780/323,\ c = 106921/9690$	$(-36/25, 1938/125)$
14	$a = 8/3,\ b = 21/2,\ c = 65/6$	$(18, 48)$
15	$a = 4,\ b = 15/2,\ c = 17/2$	$(-9, 36)$
16	–	
17	–	
18	–	
19	–	
20	–	
21	$a = 12,\ b = 7/2,\ c = 25/2$	$(-3, 36)$
22	$a = 140/3,\ b = 33/35,\ c = 4901/105$	$(2178, 101640)$
23	$a = 41496/3485,\ b = 80155/20748,\ c = 905141617/72306780$	$(559728/17689, -287596140/2352637)$
24	–	
25	–	
26	–	
27	–	
28	–	
29	$a = 99/910,\ b = 52780/99,\ c = 48029801/90090$	$(-4900/169, 6930/2197)$
30	$a = 5,\ b = 12,\ c = 13$	$(-20, 100)$
31	$a = 720/287,\ b = 8897/360,\ c = 2566561/103320$	$(1681/49, 29520/343)$
32	–	
33	–	
34	$a = 15/2,\ b = 136/15,\ c = 353/30$	$(-16, 120)$
35	–	
36	–	
37	$a = 450660/777923,\ b = 777923/6090,\ c = 605170417321/4737551070$	$(-1764/21025, -32672766/3048625)$
38	$a = 1700/279,\ b = 5301/425,\ c = 1646021/118575$	$(-1922/81, 105400/729)$
39	$a = 5/2,\ b = 156/5,\ c = 313/10$	$(-36, 90)$
40	–	