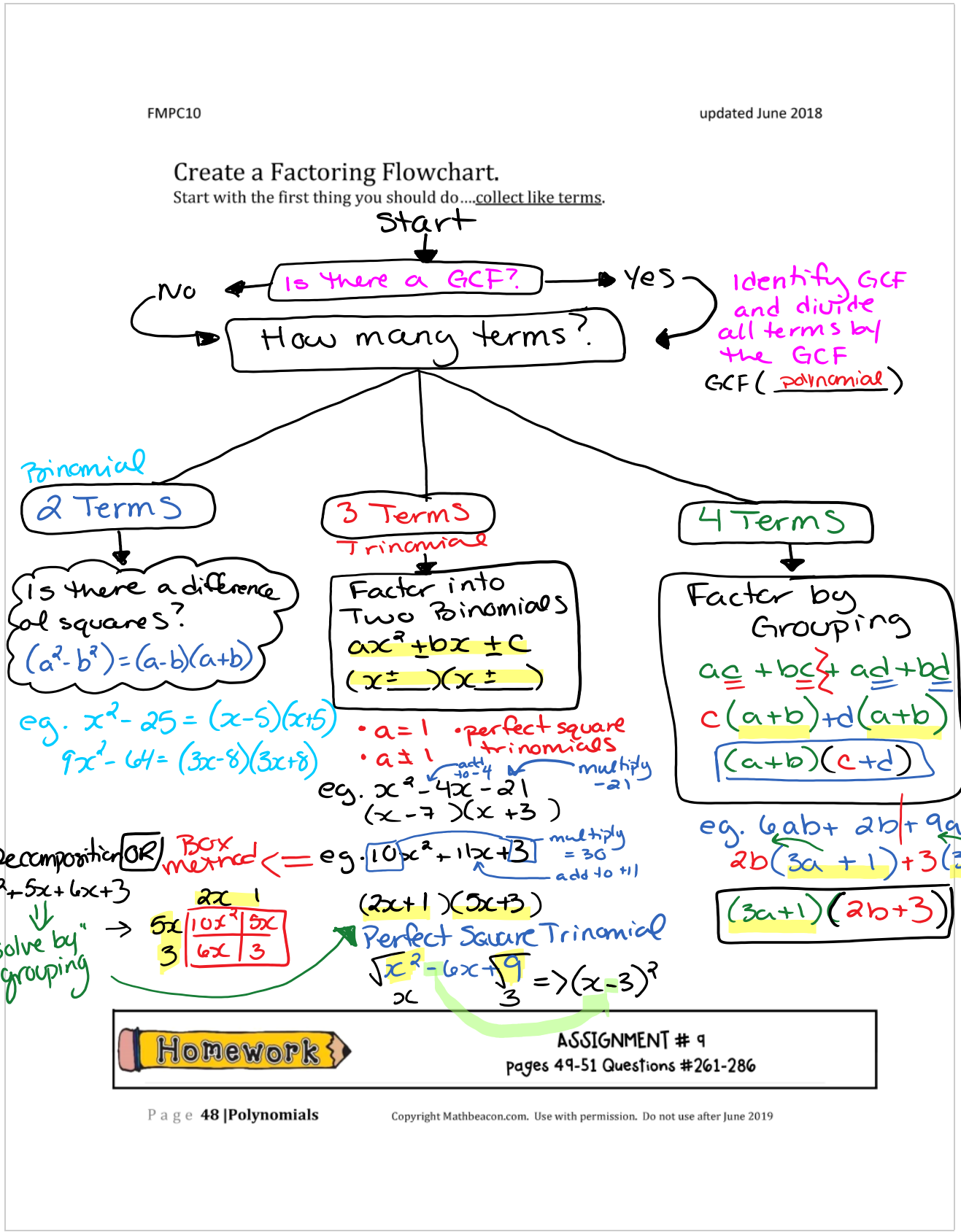
Factoring Flow Chart

November 8, 2018 7:41 PM



Combined Factoring. Factor the following completely.

261. $3a^2 - 3b^2$

262. $4x^2 + 28x + 48$

263. $x^4 - 16$

264. $2y^2 - 2y - 24$

265. $16 - 28x + 20x^2$

266. $m^4 - 5m^2 - 36$

267. $x^8 - 1$

268. $x^3 - xy^2$

269. $x^4 - 5x^2 + 4$

HIGHER DIFFICULTY...

For some of the following questions, you may try substituting a variable in the place of the brackets to factor first, and then replace brackets.

270. $(a + b)^2 - c^2$

271. $(c - d)^2 - (c + d)^2$

272. $(m + 7)^2 + 7(m + 7) + 12$

273. Factor.
$(x+2)^2-(x-3)^2$

274. Find all the values of k so that $x^2+kx-12$ can be factored.

275. For which integral values of k can $3x^2+kx-3$ be factored.

276. What value of k would make $kx^2+24xy+16y^2$ a perfect square trinomial?

277. What value of k would make $2kx^2-24xy+9y^2$ a perfect square trinomial?

278. For which integral values of k can $6x^2+kx+1$ be factored.

a. $5,7$

b. $\pm5,\pm7$

c. $-5,-7$

d. all integers from 5 to 7.

279. Expand and simplify.
$-2(3m+4)^2$

280. If $a=2x+3$, write a^2-5a+3 in terms of x.

281. Lindsay was helping Anya with her math homework. She spotted an error in Anya's multiplication below. Find and correct any errors.

Multiply:
$5x(2x+1)+2(2x+1)$

$=10x+1+4x+2$

$=14x+3$

282. When asked to factor the following polynomial, Timmy was a little unsure where to start.

Factor: $10x + 5 + 2xy + y$

What type of factoring could you tell him to perform to help him along?

283. Find and correct any errors in the following factoring.

$2x^2 - 5x - 12$

$=2x^2 -12x+2x - 12$

$=2x(x-6) +2(x-6)$

$=(2x+2)(x-6)$

284. Explain why
$3x^2 - 17x + 10 \neq (3x + 1)(x + 10)$

285. Find and correct any errors in the following multiplication.

$(x^2 + 2)^2$

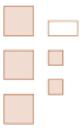
$= x^4 + 4$

286. Explain why it is uncommon to use algebra tiles to multiply the following

$(x + 1)^3$

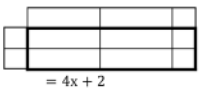
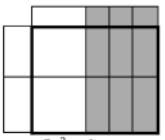
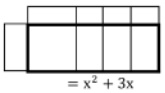
287. Multiply the expression above.

Answers:

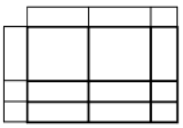
1. 5,-7
2. 13
3. x, y
4. no, negative exponent
5. yes
6. no, negative exponent
7. no, exponent not a whole number
8. yes
9. no, exponent not a whole number
10. 1, binomial
11. 3, trinomial
12. 7, polynomial
13. 0, monomial
14. Many possibilities
15. Many possibilities
16. $5x$
17. $-3x^2$
18. $x^2 + 3x + 4$
19. $-4x^2 - 2x - 3$
20. $3x^2 + 3x + 4$
21. 
22. 
23. The two terms cancel each other, resulting in a sum of 0.
24. The two expressions cancel each other, resulting in a sum of 0.
25. 0
26. $-x^2 + x - 1$
27. 
28. 
29. $-3x + 4$
30. $-x^2 + 5x + 2$
31. 0
32. 0
33. 
34. You cannot subtract / take away, or cancel the "negative-x" tile from the first expression because there was not one there. The same problem arises with the "+2".
35. Raj added "zero" in the form of opposite tiles so that he could then subtract the $(-x + 2)$ from the first expression.
36. $7x - 6$
37. $5x^2 + 5x - 8$
38. $x^2 - 4x - 8$
39. Same shape.
40. Same letter, same exponent (degree).
41. $-9x + 9y,\ -45$
42. $3x^3 - 5x^2 - 6,\ 30$
43. $11x^2y^3 - 5, -797$
44. $6x + 17$
45. $12a + 4b$
46. $4x + 4$
47. $7a$
48. $12x - 5y$
49. $19a - 3b$
50. $13x^2 - x - 5$
51. $-2m^2n - 2mn + n$
52. $-y^2 + 2y - 4$
53. $10x^2 - 6xy + 3x + 6$
54. A rectangle that is 3 by 3 has an area of 9 square units.
55. A rectangle that is 3 by 4 has an area of 12 square units.
56. 20
57. Colour one side differently. The (-2) could be shaded.
58. -12
59. -20
60. Both edges would be shaded to represent negatives.
61. 12
62. 20
63. 252
64. $(30 + 2)(10 + 4)$
    $300 + 120 + 20 + 8$
    448
65. 408
66. 252
67. =448

68. =408

7	20	4
10	200	40
7	140	28

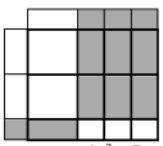
69. 345
70. 2496
71. 5329
72. $(4)(5) = 20$
73. $(-3)(6) = -18$
74. $(x)(5) = 5x$
75. $(x)(x) = x^2$
76. $(x)(-x) = -x^2$
77. $(x)(2x) = 2x^2$
78. $(3)(2x) = 6x$
79. $(-3)(2x) = -6x$
80. $(2)(-3x) = -6x$
81. $\frac{6x}{x} = 6$, length is 6 units.
82. $\frac{6x^2}{3x} = 2x$,
    length is 2x units.
83. $\frac{-6x^2}{3x} = -2x$,
    length is $-2x$ units.
84. $(2x)(x + 1) = 2x^2 + 2x$
85. $(2x)(-x + 1) = -2x^2 + 2x$
86. $(2x)(x - 2) = 2x^2 - 4x$
87. $(-2x)(x - 3) = -2x^2 + 6x$
88. 
    $= 4x + 2$
89. 
    $= 2x^2 - 6x$
90. 
    $= x^2 + 3x$
91. $-x^2 - 3x$
92. $-6x^2 - 9x$
93. $\frac{x^2+3x}{x}$ or $(x^2 + 3x) \div (x)$
    length is $x + 3$
94. $\frac{-x^2-3x}{x}$ or $(-x^2 - 3x) \div (x)$
    length is $-x - 3$

95. $\frac{2x^2-8x}{2x}$ or $(2x^2-8x)\div(2x)$
length is $x-4$
96. $2x^2+6x$
$x+3$
$2x$
97. $6x+18$
6
$x+3$
98. $2x^2+3x$
$2x+3$
x
99. $6a^2b^8$
100. $-10x^5y^8$
101. $-12x^4$
102. $\frac{3}{8}a^4b^3$ or $\frac{3a^4b^3}{8}$
103. $-5t^3$
104. $5xz^2$
105. $\frac{4x^2}{3y}$
106. $-20c^4d^4$
107. $6x^2y^2$
108. a
109. $2x^2-9x-5$
110. $2x(x+1)=2x^2+2x$
111. $2x(2x+1)=4x^2+2x$
112. $2x(x-2)=2x^2-4x$
113. $-2x(x-3)=-2x^2+6x$
114.



$=2x^2+5x+2$

115.



$=2x^2-7x+3$

116. $4-x^2$
See solutions guide for area model.
117. $-x^2+4x-3$
See solutions guide for area model.
118. $6x^2+5x+1$
See solutions guide for area model.
119. $A=lw$

$$l=\frac{A}{w}$$

$$\frac{x^2+3x+2}{x+1}$$

length: $x+2$

120. $\frac{2x^2+5x+2}{2x+1}$

length: $x+2$

121. $\frac{4x^2-8x+3}{2x-1}$

length: $2x-3$

122. Area: x^2+5x+6
Length: $x+3$
Width: $x+2$

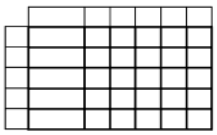
123. a: x^2+6x+9
Length: $x+3$
Width: $x+3$
124. Area: $2x^2+7x+6$
Length: $2x+3$
Width: $x+2$
125. x^2-2x-3
126. $4x^2+4x+1$
127. x^2-16
128. $x^2-3x-10$
129. $2x^2-5x-3$
130. x^2-6x+9
131. x^2+4x+4
132. $6x^2-3x-3$
133. $4x^2-1$
134. x^2+4x+4
135. $4x^2+20x+25$
136. x^3+2x^2-7x+4
137. $x^3-10x^2+26x-5$
138. $6x^3-5x^2-4x-3$
139. $x^3+6x^2+12x+8$
140. $x^2+2x-2x-4$
$(x+2)(x-2)$
$(x+2)(x-2)=x^2-4$
141. $x^2+3x-3x-9$
$(x+3)(x-3)$
$(x+3)(x-3)=x^2-9$
142. $4x^2+4x-4x-4$
$(2x+2)(2x-2)$
$(2x+2)(2x-2)=4x^2-4$
143. $9x^2+12x-12x-16$
$(3x+4)(3x-4)$
$(3x+4)(3x-4)=9x^2-16$
144. x^2-9
145. $4x^2-9$
146. $9x^2-1$
147. x^2-2y
148. $3b^2-147$
149. $-2c^2+50$
150. $2x^2+15x+30$
151. $3x^2-11x-38$
152. $30t^2-61t+25$
153. $-12y^2-20y-1$
154. $3^2\times 2$
155. $3^2\times 2^4$
156. 2^6
157. $2^3\times 3=24$
158. $2^4=16$
159. $2\times 3^2=18$
160. $5\times2\times a\times a\times b$
161. $2\times3\times3\times a\times b\times b\times c\times c\times c$
162. $2\times2\times3\times b\times b\times b\times c\times c$
163. $2ab$
164. $6b^2c^2$
165. $2b$

Challenge: $5(x+2)$

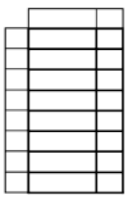
Challenge: $3x(x^2+2x-4)$

166. $5(x+5)$
167. Not factorable.
168. $8(x+1)$

169.



170. Cannot be represented as a rectangle using the tiles we have established, therefore it is not factorable.
171.



172. $2a(2x+4y-3z)$
173. $6w^3(2w-1)(2w+1)$
174. $wxy(3w^2+12y-1)$
175. $9a^2b^2(3b+1-2a)$
176. $6mn^2(m^2+3mn-2+4n)$
177. $(5x+3)(a+b)$
178. $(3m+5)(x-1)$
179. Not factorable
180. $(4t+1)(m+7)$
181. $(3t-1)(x-y)$
182. $(4y-x)(p+q)$

Challenge: $(a+b)(c+d)$

183. $(w+z)(x+y)$
184. $(x+1)(x-y)$
185. $(x+3)(y+4)$
186. $(2x+3y)(x+2)$
187. $(m+4)(m-n)$
188. $(3a-2b^2)(a-3)$

Refer to solutions guide to see algebra tiles for questions 189-192.

189. $(x+4)(x+2)$
190. $(x+7)(x+2)$
191. $(x-6)(x-1)$
192. $(x-1)(x+10)$

193. $(a+5)(a+1)$
194. $(n+5)(n+2)$
195. $(x-6)(x+5)$
196. $(q+5)(q-3)$
197. $(k-7)(k+8)$
198. $(t+8)(t+3)$
199. $(y-10)(y+3)$
200. $(g-10)(g-1)$
201. $(s-10)(s+8)$
202. $(m-3)(m-9)$
203. $(x-9)(x+3)$
204. $(p+9)(p-6)$
205. $2(y-4)^2$
206. $(a-9)(a-5)$
207. $2(x+5)(x-2)$
208. $(x^2-5)(x^2+2)$
209. $(w^3+4)(w^3+3)$
210. $(p^4-7)(p^4+3)$
211. $x(8-x)(7+x)$
212. $(x^2+16)(x^2-5)$
213. Not factorable.
214. $(x-5y)(x-y)$
215. $(x+9y)(x-4y)$
216. $(ab-3)(ab-2)$

Challenge: $(2x+3)(x+2)$

217. $(a+4)(2a+3)$
218. $(5a-2)(a-1)$
219. $(3x-2)(x-3)$
220. $(2y+3)(y+3)$
221. $(5y+1)(y-3)$
222. $(2x-3)(5x-1)$
223. $(2x+1)(x+1)$
224. $(3k-4)(2k+1)$
225. $(2y+3)(3y+1$
226. $(3x+2)(x-6)$
227. $x(3x+1)(x-2)$
228. $(3x+1)(3x+4)$
229. $(7x+3)(3x+4)$
230. $x(3x-5)(2x+3)$
231. $2(5t-3)(t+1)$
232. $(3x-y)(x-7y)$
233. $(2c-d)(2c-d)$
234. $(x^2+2)(2x^2+3)$

Challenge:

(x^2-4)
$(x+2)(x-2)$
$x^2-4=(x+2)(x-2)$

235. Answered on page.
236. x^2-9
$(x+3)(x-3)$
$x^2-9=(x+3)(x-3)$
237. $4x^2-4$
$(2x+2)(2x-2)$
$4x^2-4=(2x+2)(2x-2)$
238. $9x^2-16$
$(3x+4)(3x-4)$
$9x^2-16=(3x+4)(3x-4)$
239. $(a+5)(a-5)$
240. $(x+12)(x-12)$
241. $(1+c)(1-c)$
242. $4(x+3)(x-3)$

Note: $(2x+6)(2x-6)$ is not fully factored because there is GCF that can be removed.

243. $(3x+y)(3x-y)$
244. $(5a^2+6)(5a^2-6)$
245. $(7t+6u)(7t-6u)$
246. $7(x+2y)(x-2y)$
247. $-2(3a+b)(3a-b)$
248. $(d^2+3)(d^2-3)$
249. $(\frac{a}{3}+\frac{b}{4})(\frac{a}{3}-\frac{b}{4})$
250. $(\frac{xy}{7}+1)(\frac{xy}{7}-1)$
251. x^2+4x+4
$(x+2)(x+2)$
$x^2+4x+4=(x+2)(x+2)$

Factored Form: $(x+2)^2$

252. $x^2-3x-3x+9$
$(x-3)(x-3)$
$x^2-6x+9=(x-3)(x-3)$

Factored Form: $(x-3)^2$

253. $9x^2+12x+12x+16$
$(3x+4)(3x+4)$
$9x^2+24x+16=(3x+4)(3x+4)$

Factored Form: $(3x+4)^2$

254. $4x^2-2x-2x+1$
$(2x-1)(2x-1)$
$4x^2-4x+1=(2x-1)(2x-1)$

Factored Form: $(2x-1)^2$

255. $(x+7)^2$
256. $(2x-1)^2$
257. $(3b-4)^2$
258. $4(4m-1)^2$

Careful. Look for the GCF first.

259. $(9n+5)^2$
260. $(9x-8y)^2$

261. $3(a+b)(a-b)$
262. $4(x+4)(x+3)$
263. $(x^2+4)(x+2)(x-2)$
264. $2(y-4)(y+3)$
265. $4(5x^2-7x+4)$
266. $(m+3)(m-3)(m^2+4)$
267. $(x+1)(x-1)(x^2+1)(x^4+1)$
268. $x(x+y)(x-y)$
269. $(x+2)(x-2)(x+1)(x-1)$
270. $(a+b+c)(a+b-c)$
271. $-4dc$
272. $(m+11)(m+10)$
273. $5(2x-1)$
274. $\pm1, \pm4, \pm11$
275. $\pm8, 0, 3$
276. $k=9$
277. $k=8$
278. b
279. $-18m^2-48m-32$
280. $4x^2+2x$
281. The second line should read $10x^2+5x+4x+2$. The simplified answer would then be $10x^2+9x+2$.
282. Factor by grouping.
283. The first step in decomposition should have read
$2x^2-8x+3x-12$
$2x(x-4)+3(x-4)$
$(2x+3)(x-4)$
284. If we expand the two binomials, the middle term will not equal -17.
285. $(x^2+2)(x^2+2)$
$x^4+2x^2+2x^2+4$
x^4+4x^2+4
286. We would need to describe the tiles in 3-dimensions.
287. x^3+3x^2+3x+1

Additional Material:

288. $x=\pm6$
289. $x=\pm4$
290. $x=\pm\frac{3}{2}$
291. $x=\pm\sqrt{7}$
292. $x=-8$ or 7
293. $x=-3$ or 7
294. $x=\frac{3}{2}$
295. $n=3$ or $\frac{2}{3}$
296. $a=b$ or $a=-b$
297. $x^3+2x^2+3x+2=(x+1)(x^2+x+2)$
298. $t^3+3t^2-5t-4=(t+4)(t^2-t-1)$
299. $m^3+2m^2-m-4=(m+1)(m^2+m-2)-2$
300. $x^3-4x^2-2x+8=(x-4)(x^2-2)$
301. $m^3+3m^2-4=(m+2)(m^2+m-2)$
302. $a^3-3a+6=(a+1)(a^2-a+2)+8$
303. $n^3+2n^2-n-2=(n^2-1)(n+2)$
304. $6r^2-25r+14=(3r-2)(2r-7)$
305. $12s^3+3s^2-20s-5=(3s^2-5)(4s+1)$
306. $4y^2-29=(2y-5)(2y+5)-4$