

CHAPTER R REVIEW OF BASIC CONCEPTS

Section R.1 Real Numbers and Their Properties

Let set $M = \left\{ \frac{7}{3}, \sqrt{16}, 0, -\frac{2}{3}, -14, \sqrt{17}, 4\pi, 2.\bar{8}, 9, -\sqrt{6} \right\}$. List all the elements of M that belong to the given sets.

- | | |
|-----------------------|---------------------|
| 1. Natural numbers | 2. Whole numbers |
| 3. Integers | 4. Rational numbers |
| 5. Irrational numbers | 6. Real numbers |

Let set $K = \left\{ -\sqrt{2}, \frac{3}{8}, \sqrt{100}, -2.3, 0, -27, -\frac{5}{6}, \frac{\pi}{3}, -\sqrt{1}, 15 \right\}$. List all the elements of K that belong to the given sets.

- | | |
|------------------------|----------------------|
| 7. Natural Numbers | 8. Whole numbers |
| 9. Integers | 10. Rational numbers |
| 11. Irrational numbers | 12. Real numbers |

For Exercises 13–22, choose all words from the following list that apply.

Natural number	Whole number	Integer	Not defined
Rational number	Irrational number	Real number	
13. $\frac{3}{4}$		14. $\sqrt{7}$	
15. 745		16. $\frac{12}{0}$	
17. $-3.\overline{275}$		18. $\frac{2\pi}{3}$	
19. $-\frac{0}{5}$		20. $-\sqrt{144}$	
21. 3.72		22. -1000	

Evaluate each exponential expression.

- | | |
|--------------|-----------------|
| 23. 4^3 | 24. -4^3 |
| 25. $(-7)^2$ | 26. $-(-7)^2$ |
| 27. 2^6 | 28. 3^5 |
| 29. -3^4 | 30. $(-1)^{15}$ |

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31. -1^{15}

32. -6^4

Evaluate each expression.

33. $8 - 7^2 - (-6)$

34. $12 - (-8) \div (-2) + 4$

35. $8 - 24 \div 2^2 \cdot 6$

36. $3^4 - 4^3 + (-3)^3$

37. $(3 - 2^3)(-5 - 3^2)$

38. $(\sqrt{36} - 6^2)(-6 + \sqrt{81})$

39. $\frac{1}{3} - \left[\frac{3}{4} - \left(\frac{2}{3} - \frac{1}{2} \right) \right]$

40. $\left(\frac{1}{3} - \frac{3}{4} \right) - \left(\frac{2}{3} - \frac{1}{2} \right)$

41. $\frac{7 - (-2 + 5)^2 \cdot 2}{8 \div (-2) - 1}$

42. $\frac{-5 + 25 \div 5 \div 5}{(-5 + 25) \div (5 \div 5)}$

Evaluate each expression if $a = -1$, $b = 3$, and $c = -2$.

43. $4(a + b - 3c)$

44. $a^3 - b^2 + 3c$

45. $\frac{3}{a} - \frac{9}{b}$

46. $\frac{a + 2b}{b - 3c}$

47. $\frac{\frac{a}{2} - b}{a + \frac{c}{4}}$

48. $\frac{(a - 2c)^3 + 3b^2}{2b - 9}$

Identify the property illustrated in each statement.

49. $\pi \cdot 1 = \pi$

50. $\left(\frac{2}{3} \cdot \frac{2}{7} \right) \cdot \frac{3}{4} = \frac{2}{3} \cdot \left(\frac{2}{7} \cdot \frac{3}{4} \right)$

51. $[3 + (-3)] + 0 = 3 + [(-3) + 0]$

52. $4(x + y) = 4(y + x)$

53. 2π is a real number.

54. $\frac{a+3}{a-2} \cdot \frac{a-2}{a+3} = 1$ if $a \neq -3$ or 2

55. $5(6 - 6) = 5 \cdot 6 - 5 \cdot 6$

56. $\frac{2}{5} \cdot 1 = 1 \cdot \frac{2}{5}$

57. $1 + 0 = 1$

58. $\frac{1}{2} \cdot 2 - \frac{1}{2} \cdot \pi = \frac{1}{2}(2 - \pi)$

59. $(ab)c = (ba)c$

60. $3a + (-3a) = 0$

61. $(3 \cdot 1) \cdot x = 3 \cdot (1 \cdot x)$

62. $\sqrt{3} + \sqrt{7}$ is a real number.

63. $5 + (-3) = (-3) + 5$

64. $a(b + 0) = ab$

65. $\frac{3}{5} + \frac{2}{3}$ is a real number.

66. $a[b + (-b)] = ab + a(-b)$

67. $(3 \cdot 1)x = 3x$

68. $\left(3 \cdot \frac{1}{3}\right)x = 1 \cdot x$

Use the distributive property to rewrite sums as products and products as sums.

69. $12x - 32x$

70. $16a + 20a$

71. $-3(x - z)$

72. $5(a + c)$

73. $3x + 3y$

74. $-4(r - s)$

Simplify each expression.

75. $\left(\frac{3}{8}s\right)(-24)$

76. $\frac{2}{9}(36z)$

77. $(3 + a) + 12$

78. $-\frac{1}{3}(12x - 15y + 6z)$

79. $\frac{3}{7}\left(\frac{1}{4}a - \frac{2}{3}b - \frac{14}{15}\right)$

80. $-12\left(\frac{3}{8}x + \frac{8}{3}z - \frac{17}{24}\right)$

Section R.2 Order and Absolute Value

Write the numbers in each list in numerical order, from smallest to largest. Use a calculator as necessary.

81. $-1, \sqrt{3}, -8, -\sqrt{2}, \frac{1}{2}$

82. $\sqrt{7}, -\sqrt{6}, \sqrt{5}, -2, 3, -3$

83. $\frac{1}{3}, \frac{2}{7}, \frac{3}{10}, \frac{4}{17}, \frac{5}{18}$

84. $\frac{2}{5}, -\frac{13}{17}, -\sqrt{3}, -\frac{17}{10}, -\frac{18}{7}, 0$

85. $|-5|, -|-3|, -|8|, |2|$

86. $-|2|, -|-4|, |\sqrt{3}|, -\left|\frac{3}{2}\right|$

Let $x = -5$ and $y = 3$. Evaluate each expression.

87. $|x - y|$

88. $|y - 3x|$

89. $3|x| - 2y$

90. $|-3x| - 5|y|$

91. $\frac{|x|+|y|}{|x+y|}$

92. $\frac{3|x|}{2x|y|-2y|x|}$

Write each expression without absolute value bars.

93. $|-1+\sqrt{3}|$

94. $|2-\sqrt{5}|$

95. $|x+7|$, if $x < -7$

96. $|3r-9|$, if $r > 3$

97. $|r-s|$, if $r < s$

98. $|a^2+9|$

Find the distances between points P , Q , R , and S on a number line, with coordinates -12 , -3 , 4 , and 7 respectively.

99. $d(P, R)$

100. $d(P, S)$

101. $d(P, Q)$

102. $d(Q, S)$

103. $d(R, S)$

104. $d(Q, R)$

Section R.3 Polynomials

Use the properties of exponents to simplify each expression.

105. $(3^8)^9$

106. $x^5x^{10}x^8$

107. $-2(3x^4)^2$

108. $(4x^5y^3)^3$

109. $\left(\frac{a^3}{b^7}\right)^5$

110. $\left(\frac{2xy^8}{3z^3}\right)^4$

111. $-(3a^7b^2)^0$

112. $-5(4x^0y^1)^2$

113. $-\left(\frac{x}{y}\right)^0$

114. $12\left(\frac{m^5n^9}{8}\right)^2$

Identify each expression as a polynomial or not a polynomial. For each polynomial, give the degree and identify as monomial, binomial, trinomial, or none of these.

115. $17y^8 - 12y^3 + 5y$

116. $\sqrt{2}x + \sqrt{5}$

117. $\frac{2}{3}x^5 - \frac{1}{8}x^7$

118. $15x^3y^8$

119. $\frac{1}{3}p^3 - \frac{1}{3p}$

121. $\sqrt{x} + \sqrt{a}$

123. $\sqrt{3} - \sqrt{2}z^5$

120. $7t^{20} - t^{15} + t^{10} - \pi$

122. $-8a^5$

124. 18

Find each sum or difference.

125. $(7x^2 + 5x - 8) + (2x^2 - 12x - 4)$

126. $(3a^2 - 6a - 8) + (2a^2 - 3a^2 - 7)$

127. $(3x^3 - 2x^2 - 15) - (-4x^3 + 8x - 2)$

128. $(m^4 - 5m^3 + 7m) - 2(3m^4 - 3m^3 + 4m - 3)$

129. $(3a^3 - 2a^2 - 13a - 7) + 6(-2a^3 - a^2 - a - 3)$

130. $(m^3 + 5m - 17) + (5m^2 - 4m - 12) - (2m^3 - 3m - 2)$

131. $-(5r^4 + 7r + 8) - (2r^3 - r^2 - 5) - (-3r^2 + 7r + 5)$

132. $-(-x^4 - x^3 - 15x^2 + 8) - 2(3x^4 - 7x^2 - 7) - (x^4 + 3x^3 + 9)$

Find each product.

133. $(5y - 8)(7y + 3)$

134. $(5m - 2)(m - 9)$

135. $x^3(2x - 5)(2x + 7)$

136. $\left(3t + \frac{2}{3}\right)\left(3t - \frac{5}{2}\right)$

137. $\left(x + \frac{3}{4}\right)\left(6x + \frac{4}{3}\right)$

138. $-4x^2(-3x^4 - 2x^3 - 7x^2 + 3)$

139. $(3z - 2)(z^2 + 5z - 1)$

140. $(3a + 1)(4a^3 - a^2 - a - 2)$

141. $(r^2 - 4rs + 8s^2)(r^2 + 4rs + 8s^2)$

142. $(a + b - c)(a - b - 2c)$

143. $(r + 2s + 3t)(3r - 2s - t)$

144. $(a + b + c - 2)(a - c)$

145. $(3x + 7y)^2$

146. $(5x - y)(5x + y)$

147. $(m^3 - n^2)(m^3 + n^2)$

149. $(8s^7 - 3)^2$

151. $\left(2t + \frac{3}{2}\right)^2$

153. $(z+3)^4$

155. $(3t-1)^3$

157. $[(2a-3b)+5]^2$

159. $5(-2s^2 + 8s - 6) - 4(3s^2 + 5s - 10)$

161. $3x(x^2 + 3) - 2x^2(-x + 12)$

148. $(3a^2 + 5b)^2$

150. $(8x^2 - 7y^4)(8x^2 + 7y^4)$

152. $\left(3x - \frac{1}{3}\right)\left(3x + \frac{1}{3}\right)$

154. $(p-4)^3$

156. $[(2r-1)-3s][(2r-1)+3s]$

158. $[(3a-8)-2b]^2$

160. $q(7q+9) - 5(2q-4)$

162. $-7y^2(2y^2 - 8y) + 3y(y^3 + 14y)$

Perform each division.

163.
$$\frac{28x^8 + 16x^6 - 20x^5 - 32x^3}{-4x^3}$$

165.
$$\frac{50a^5b^6 - 10a^5b^4 + 25a^4b^3}{5a^4b^2}$$

167.
$$\frac{21x^3 + 23x^2 - 23x - 5}{3x + 5}$$

169.
$$\frac{3y^4 + 4y^3 - 13y^2 + 21y + 7}{3y - 2}$$

171.
$$\frac{4x^4 + 2x^3 + 8x^2 - 3x - 12}{2x^2 - 3}$$

164.
$$\frac{-30x^5 + 18x^4 + 6x^2 - 18x + 42}{6x^3}$$

166.
$$\frac{5x^4 + 2x^3 - 36}{x + 2}$$

168.
$$\frac{6b^4 + 13b^3 - 5b + 6}{2b + 3}$$

170.
$$\frac{2x^3 - x^2 + 8x - 1}{x^2 + 4}$$

172.
$$\frac{64y^4 - 81}{y^2 + 9}$$

Section R.4 Factoring Polynomials

Factor out the greatest common factor from each polynomial.

173. $16m - 40$

175. $4a^5b^4 - 12a^3b^3$

177. $20x^7y^8 - 35x^5y^4 - 15x^4y^4$

174. $xy^3 + 3x^2y$

176. $15r^2s^3 + 18r^2s^2 - 9rs^2$

178. $-p^4q^4 - 2p^4q^2 - 2q^2$

179. $3(3z+5)-2z(3z+5)$

181. $(a+3b)(a-2b)+(2a+5b)(a-2b)$

Factor each polynomial by grouping.

183. $rs+3r+2s+6$

185. $12mt-4m+2t-7$

187. $8x^2-6x+20xy-15y$

189. $15x^2y^2-18x^2-5y^2+6$

191. $b^3c^2-2b^3+7c^2-14$

Factor each trinomial.

193. $8x^2+18x-5$

195. $12h^2+31h+20$

197. $12a^2+ab-b^2$

199. $24x^3+54x^2+27x$

201. $24p^2-15pq-9q^2$

203. $3x^2y^2+7xy-40$

205. $100p^2+60p+9$

207. $9x^2y^2+42xy+49$

209. $(5m-2n)^2-12(5m-2n)+36$

Factor each polynomial.

210. $64a^2-81$

212. $16x^4-1$

214. $1-(s-t)^2$

216. $64a^3-b^3$

180. $2(x-4)^2-5(x-4)$

182. $4(2x-1)-2(2x-1)^2-3(2x-1)^3$

184. $2ab-3a+16b-24$

186. $3x^2-24x+5xy-40y$

188. $6a^2-2ab+3ab^2-b^3$

190. $6s^3-15s^2t+2st^2-5t^3$

192. $xyz+5xy+3z+15$

194. $9m^2-21m+10$

196. $10a^2-24a-18$

198. $6s^2-7st-10t^2$

200. $8yz^2+36yz-72y$

202. $6m^2+16mn-6n^2$

204. $3a^2b^2+10ab+3$

206. $64a^2-80ab+25b^2$

208. $(r+2s)^2+8(r+2s)+16$

211. $100p^2-49q^2$

213. $(y+2z)^2-16$

215. t^3+216

217. $64x^3+8y^3$

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218. $216m^3 - 27n^3$

220. $(a+2)^3 - 1$

222. $8 - (y+z)^3$

224. $a^6 - 64b^6$

219. $b^9 + 8c^3$

221. $(z+3)^3 + 125$

223. $1 - (r-s)^3$

Factor each polynomial by substitution.

225. $a^4 + 7a^2 - 18$

227. $(x+5)^2 - 4(x+5) - 12$

229. $4(3b+4)^2 - 16(3b+4) + 15$

226. $4z^4 + 7z^2 - 36$

228. $(3x+5)^2 + 17(3x+5) + 72$

230. $6(5-y)^2 + 37(5-y) + 6$

Factor by any method.

231. $9a^2 + 12ab + 4b^2 - 25$

233. $7x^2 - 12xy - 4y^2$

235. $x^3 + 2x^2 - xy^2 - 2y^2$

237. $r^2 - s^2 + 10s - 25$

239. $343m^3 - 125$

232. $z^6 + 125$

234. $9b^4 - 10b^2 + 1$

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

238. $9z^2 + 26z + 16$

240. $(y+15)^2 - 2(y+15) - 3$

Section R.5 Rational Expressions

Find the domain of each rational expression.

241. $\frac{3x+1}{x+3}$

243. $\frac{4}{x^2+x-12}$

245. $\frac{2x+5}{4x^2+4x+1}$

242. $\frac{4x-9}{2x-3}$

244. $\frac{3}{x^2-2x}$

246. $\frac{12x}{25-x^2}$

Write each rational expression in lowest terms.

247. $\frac{7x+21}{14x-35}$

248. $\frac{6a-15}{6a+21}$

249. $\frac{36y^2 + 24y}{4y^2}$

251. $\frac{2r^2 + 16r}{r^2 - 16r}$

253. $\frac{m^2 + 8m + 15}{m^2 - 25}$

255. $\frac{3x^2 - x - 10}{9x^2 - 25}$

250. $\frac{18z^3 + 30z}{10z^2}$

252. $\frac{x^2 - x}{x^2 - 1}$

254. $\frac{y^2 - 7y - 30}{y^2 + 7y + 12}$

256. $\frac{2z^2 + 17z + 35}{3z^2 + 16z + 5}$

Find each product or quotient.

257. $\frac{2a^5}{7a^2} \cdot \frac{21a^6}{10a^8}$

259. $\frac{5x - 15}{36} \cdot \frac{30}{2x - 6}$

261. $\frac{2y + 7}{6y - 14} \cdot \frac{18y^2 - 42y}{4y^2 - 49}$

263. $\frac{m^2 + 7m + 12}{m^2 + 7m + 6} \div \frac{m^2 + 12m + 32}{m^2 - 6m - 7}$

265. $\frac{xy + 3x + 2y + 6}{xy + 2x + 3y + 6} \div \frac{x^2 + 7x + 10}{y^2 + 4y + 4}$

258. $\frac{12b^3}{20b^5} \div \frac{10b^2}{24b^7}$

260. $\frac{24t - 16}{10} \div \frac{15t - 10}{2}$

262. $\frac{x^2 - 4}{x^2 - 16} \div \frac{x^2 - 6x + 8}{x^2 + 6x + 8}$

264. $\frac{3z^2 + 5z + 2}{2z^2 + 5z + 3} \cdot \frac{2z^2 + z - 3}{9z^2 - 4}$

266. $\frac{8z^3 - 1}{4z^2 - 2z + 1} \cdot \frac{8z^3 + 1}{4z^2 - 4z + 1}$

Perform each addition or subtraction.

267. $\frac{7}{9b} + \frac{7}{15b}$

269. $\frac{7}{10m} - \frac{5}{8m^2}$

271. $\frac{14x - 2}{7x - 2} + \frac{7x - 4}{7x - 2}$

273. $\frac{8}{3 - 2x} - \frac{7}{2x - 3}$

275. $\frac{1}{y - 1} - \frac{1}{y^2 + y + 1} - \frac{2}{y^3 - 1}$

268. $\frac{1}{8z} + \frac{3}{10z} + \frac{5}{12z}$

270. $\frac{3}{10x^3y} + \frac{9}{14x^2y^2}$

272. $\frac{12a - 6}{2a - 3} - \frac{2a + 9}{2a - 3}$

274. $\frac{8q}{p - 2q} + \frac{4p}{2q - p}$

276. $\frac{1}{x - 2} - \frac{2}{x^2 + 2x + 4} - \frac{12}{x^3 - 8}$

277.
$$\frac{3x-2}{x^2-4} - \frac{7}{x^2+3x-10}$$

278.
$$\frac{y}{6y^2+5y+1} + \frac{5y+4}{6y^2+11y+3}$$

Simplify each complex fraction.

279.
$$\frac{2 + \frac{1}{a}}{4 - \frac{1}{a}}$$

280.
$$\frac{\frac{1}{b} - \frac{1}{2}}{\frac{1}{b} + 1}$$

281.
$$\frac{16 - \frac{9}{t^2}}{4 + \frac{3}{t}}$$

282.
$$\frac{\frac{1}{x^2} - 4}{\frac{1}{x^2} - \frac{2}{x}}$$

283.
$$\frac{\frac{1}{z+1} - 1}{\frac{1}{z+2} - 1}$$

284.
$$\frac{\frac{1}{y-2} - \frac{1}{y}}{\frac{1}{y-2} + \frac{1}{y}}$$

285.
$$\frac{3h - \frac{1}{9h^2-1}}{\frac{1}{3h-1}}$$

286.
$$\frac{m + \frac{1}{4m^2-25}}{\frac{1}{2m+5}}$$

287.
$$\frac{\frac{1}{(x+h)^2} - \frac{1}{x^2}}{h}$$

288.
$$\frac{\frac{1}{x+h-1} - \frac{1}{x-1}}{h}$$

Section R.6 Rational Exponents

Write each expression with only positive exponents and evaluate if possible. Assume all variables represent nonzero real numbers.

289. -8^{-2}

290. $(-9)^{-2}$

291. $\left(\frac{2}{3}\right)^{-3}$

292. $-\left(\frac{1}{5}\right)^{-4}$

293. $2x^{-3}$

294. $(2x)^{-3}$

295. $-y^{-8}$

296. $-3z^{-4}$

Perform the indicated operations. Write each result using only positive exponents. Assume all variables represent nonzero real numbers.

297. $\frac{7^{-2}}{7^{-5}}$

298. $\frac{a^{14}}{a^{-3}}$

299. $\frac{5z^{-4}}{15z^5}$

301. $\frac{3a^5b^7}{9a^{-3}b^5}$

303. $\frac{(5t^4)^0}{(3t^{-5})^2}$

300. $\frac{20r^8}{32r^{-2}}$

302. $(5x^3)^{-3}(x^5)^{-2}$

304. $\frac{(5y^{-2})^{-2}(3y^2)}{(6y^{-3})^{-1}y^{-2}}$

Simplify each expression.

305. $4^{5/2}$

307. $(-64)^{4/3}$

309. $216^{-2/3}$

311. $\left(\frac{4}{81}\right)^{-3/2}$

306. $-16^{3/2}$

308. $100^{-1/2}$

310. $-32^{-3/5}$

312. $-\left(\frac{125}{343}\right)^{-2/3}$

Perform the indicated operations. Write the answer using only positive exponents. Assume all variables represent positive real numbers.

313. $5^{7/5} \cdot 5^{3/5}$

315. $a^{7/4} \cdot a^{9/4}$

317. $\frac{x^{3/7}}{x^{2/7} \cdot x^{-2}}$

319. $\frac{(y^{5/6})^{3/10}}{(y^{7/8})^4}$

321. $\left(\frac{216a^5}{125b^7}\right)^{1/3} \left(\frac{16b^{-4}}{81a^{-1}}\right)^{1/4}$

314. $\frac{27^{7/12}}{27^{1/4}}$

316. $\frac{z^{1/6} \cdot z^{7/6}}{z^{5/6}}$

318. $\frac{(x^{2/5}y^{5/6})^{30}}{x^5}$

320. $\left(\frac{r^3}{s^5}\right)^{2/3} \left(\frac{s^3}{r^8}\right)^{4/3}$

322. $\frac{p^{1/3}p^{3/5}p^{-1/10}}{(p^{5/6})^{-1}}$

Find each product. Assume that all variables represent positive real numbers.

323. $x^{2/3}(2x^{7/3} - x^{4/3})$

325. $5a(a^{3/5} - 7a^{3/4})$

327. $(p^{3/4} - p^{-1/4})(2p^{1/4} + p^{-3/4})$

324. $-3y^{1/6}(2y^{5/6} + 5y^{23/6})$

326. $(3z^{1/2} - 2z)(3z^{1/2} + 2z)$

328. $(r^{3/2} + r^{-1/2})^2$

Perform all indicated operations and write the answer with positive integer exponents.

329. $\frac{p^{-1} + 2q^{-1}}{(pq)^{-2}}$

330. $\frac{a^{-1} - b^{-1}}{ab^{-1} - a^{-1}b}$

331. $\frac{x^{-1} - y^{-1}}{x - y} \cdot \frac{x^{-1} + y^{-1}}{x + y}$

332. $\frac{x^2 - y^2}{x^{-2} - y^2}$

333. $\frac{4t^{-2} - 1}{2t^{-1} - 1}$

334. $\frac{(y - z)^{-1}}{y^{-1} - z^{-1}}$

Section R.7 Radical Expressions

Write in radical form. Assume all variables represent positive real numbers.

335. $r^{3/8}$

336. $(5m - 2n)^{7/2}$

Write in exponential form. Assume all variables represent positive real numbers.

337. $\sqrt[3]{p^4}$

338. $3\sqrt{5y^7}$

Simplify each expression.

339. $\sqrt{(-3)^2}$

340. $\sqrt[8]{y^8}$

341. $\sqrt{(2x+9)^2}$

342. $\sqrt[6]{(r-s)^6}$

Simplify each expression. Assume all variables represent positive real numbers.

343. $\sqrt[3]{-343}$

344. $\sqrt[4]{-1}$

345. $\sqrt[3]{135}$

346. $\sqrt[4]{96}$

347. $-\sqrt[5]{128}$

348. $\sqrt{10x} \cdot \sqrt{3yz}$

349. $-\sqrt{\frac{40}{49}}$

350. $\sqrt[3]{\frac{16}{125}}$

351. $\sqrt[5]{\frac{a}{b^5}}$

352. $\sqrt[4]{25(-2)^6(5)^7}$

353. $\sqrt{32x^5y^{12}}$

354. $\sqrt[3]{54a^6b^3}$

355. $\sqrt[4]{m^4 + 16}$

356. $\sqrt{\frac{7}{5p}}$

357. $\sqrt{\frac{r^8 s^6}{t^5}}$

358. $\sqrt[3]{\frac{3}{4a}}$

359. $\sqrt[4]{\frac{6x^3 y}{25z^7}}$

360. $\sqrt[10]{7^5}$

361. $\sqrt[3]{\sqrt{2}}$

362. $\sqrt[8]{\sqrt{8}}$

Simplify each expression, assuming all variables represent positive real numbers.

363. $5\sqrt[3]{40} - 7\sqrt[3]{5}$

364. $8\sqrt{14} + 3\sqrt{21}$

365. $6\sqrt{5a} + 7\sqrt{45a} - \sqrt{80a}$

366. $\sqrt[4]{64x^9 y^6} + 3x\sqrt[4]{4x^5 y^6}$

367. $(\sqrt{13} - \sqrt{5})(\sqrt{13} + \sqrt{5})$

368. $(\sqrt[3]{5} + 2)(\sqrt[3]{5^2} - 2\sqrt[3]{5} + 4)$

369. $(\sqrt{15} - \sqrt{10})^2$

370. $(3\sqrt{7} + \sqrt{2})(2\sqrt{7} - 5\sqrt{2})$

371. $\frac{\sqrt[3]{4a^2 b} \cdot \sqrt[3]{16a^5 b^3}}{\sqrt[3]{2ab}}$

372. $\sqrt[4]{\frac{1}{x^8}} + \sqrt[4]{\frac{2}{x^4}}$

373. $\frac{3}{\sqrt{3}} - \frac{2}{\sqrt{12}} - \frac{2}{\sqrt{27}}$

374. $\frac{3}{\sqrt[3]{4}} + \frac{2}{\sqrt[3]{32}} + \frac{5}{\sqrt[3]{108}}$

Rationalize the denominator of each radical expression. Assume all variables represent nonnegative numbers and that no denominators are 0.

375. $\frac{\sqrt{5}}{\sqrt{6} + \sqrt{5}}$

376. $\frac{3 - \sqrt{7}}{2\sqrt{3} + 5\sqrt{7}}$

377. $\frac{\sqrt{a}}{\sqrt{a} - 2}$

378. $\frac{5m}{1 - \sqrt{m}}$

379. $\frac{y}{\sqrt{x+y} - 2}$

380. $\frac{h}{\sqrt{a+h} - \sqrt{a}}$

CHAPTER 1 EQUATIONS AND INEQUALITIES

Section 1.1 Linear Equations

Solve each equation.

1. $7x + 9 = 3x - 7$
2. $-5x + 2 = -7x + 10$
3. $3(2 - 7x) = 1 - 2(9x + 5)$
4. $3(x - 8) - 5x + 6 = -4 - (4 - 3x)$
5. $4x - \frac{2}{5}x + \frac{1}{4} = \frac{3}{10}$
6. $\frac{2}{3}x - \frac{3}{8} = \frac{1}{6}x + \frac{5}{12}$
7. $4[5x - (3 - 8x) + 6x] = -x - 5$
8. $\frac{4}{9}(5x - 1) = \frac{9x - 3}{4}$
9. $.8x - .3 = .3x + .9$
10. $.23x + .27 = .78x + .05$
11. $7(2x - 5) + 15x = 5(9x - 7) + 87x$
12. $\frac{1}{6}x + 2.4 = \frac{6}{5}x - .7$
13. $\frac{3}{8}x + .13x - 6 = \frac{1}{12}x + \frac{13}{40}$
14. $.03x + .02(x - 18) = 1.84$

Decide whether each equation is an identity, a conditional equation, or a contradiction. Give the solution set.

15. $3(2 - x) + 4x = 5x + 2(1 - 2x)$
16. $12(x - 3) + 2 = 6(x - 4) + 6x - 10$
17. $2(x + 1) + 3(x + 2) = 3(x + 1) + 2(x + 2)$
18. $7x - (x + 7) = 6x - (5x + 7)$
19. $.7(x + 3) - .4(x + 8) = .3(x + 7) - .8(x + 4)$
20. $7(x - 2) = 2(x - 12) + 5(x + 2)$

Solve each formula for the indicated variable. Assume that the denominator is not 0 if variables appear in the denominator.

21. $V = lwh$ for w (volume of a rectangular box)
22. $P = 2l + 2w$ for w (perimeter of a rectangle)
23. $A = \frac{1}{3}Bh$ for h (volume of a pyramid)
24. $E = \frac{1}{2}mv^2$ for m (kinetic energy)
25. $S = 2w^2 + 4wh$ for h (surface area of a rectangular box with a square base)
26. $S = lw + 2wh + 2hl$ for l (surface area of a rectangular box with an open top)

Solve each equation for x .

27. $3(x - 2a) + 2b = x - a$
28. $bx - 2a = a(x - 3)$