Practice 2 Questions

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Selected exercises chapter 2 of Pure Mathematics 1 by Hugh Neil and Douglas Qaling.

1. Simply the following expressions:
   a) $\sqrt{8} + \sqrt{18}$
   b) $\sqrt{3} + \sqrt{12}$
   c) $(\sqrt{2} - 1)(\sqrt{2} + 1)$
   d) $\left(\frac{2x^2y^{-1}}{8x^{-1}y^2}\right)^{-\frac{1}{2}}$
   e) $(2x^6y^8)^{\frac{1}{4}}(8x^{-2})^{\frac{1}{4}}$
   f) $\frac{1}{2 - \sqrt{3}}$
   g) $\frac{(49r^3s^2)^2}{(7rs)^3}$
   h) $(2a^2)^3(3a)^2$
   i) $3b^{\frac{1}{4}}4b^{-\frac{1}{2}}$
   j) $6c^{\frac{1}{5}}(4c)^{\frac{3}{5}}$
   k) $(4p^{1}\cdot q^{-3})^{\frac{1}{2}}$
   l) $\frac{(5b)^{-1}}{(8b^6)^{\frac{1}{2}}}$

2. ABCD is a rectangle in which $AB = 4\sqrt{5}$cm and $BC = \sqrt{16}$cm. Giving each answer in simplified surd form, find
   (a) the area of the rectangle, (b) the length of the diagonal AC.
3. Prove the following mathematical statements:

a) \(a^n \cdot a^n\)

b) \(a^0 = 1\)

c) \(a^{-m} = \frac{1}{a^m}\)

d) \(\sqrt[n]{x} = x^{\frac{1}{n}}\)

4. Solve the equation:

a) \(\frac{2^{5x+2}}{9^{1-x}} = \frac{2^{7x+3x}}{729}\)

b) \(4^{2x} \cdot 8^{x-1} = 32\)

c) \(\frac{125^{3x}}{5^{x+1}} = \frac{25^{(x-2)}}{3125}\)

d) \(3^t \cdot 9^{t+3} = 27^2\)

e) \(x^{\frac{3}{2}} = 2\sqrt{x}\)

5. In the diagram, angles ABC and ACD are right angles. Given that \(AB = CD = 2\sqrt{6}\) cm and \(BC = 7\) cm, show that the length of AD is between \(4\sqrt{6}\) cm and \(7\sqrt{2}\) cm.

![Diagram with points A, B, C, and D]

6. Given that, in standard form, \(3^{236} \approx 4 \cdot 10^{112}\), and \(3^{-376} \approx 4 \cdot 10^{-180}\), find approximations, also given in standard form, for a) \(3^{376}\) b) \(3^{612}\) c) \((\sqrt{3})^{236}\) d) \((3^{-376})^{\frac{3}{2}}\)

7. Express each of the following in the form \(2^n\).

a) \(2^{70} + 2^{70}\)

b) \(2^{-400} + 2^{-400}\)

c) \(2^{\frac{1}{2}} + 2^{\frac{1}{2}} + 2^{\frac{1}{2}} + 2^{\frac{1}{2}}\)

d) \(2^{100} - 2^{99}\)

e) \(8^{0.1} + 8^{0.1} + 8^{0.1} + 8^{0.1} + 8^{0.1} + 8^{0.1} + 8^{0.1} + 8^{0.1}\)