

**University of Saskatchewan**  
**Department of Mathematics and Statistics**  
**Math Placement Sample Test, June 2008**

**INSTRUCTIONS:**

- Time limit: 70 minutes.
  - All questions are of equal value.
  - Print your name clearly on the opscan.
  - Encode your student ID number on the opscan sheet.
  - Encode your answers carefully on the opscan sheet.
  - Write your student ID number on the opscan sheet.
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1. Simplify:  $\frac{\frac{2}{3} + 4}{\frac{4}{5} + \frac{5}{6}}$
- (a) 2
  - (b)  $\frac{343}{30}$
  - (c)  $\frac{169}{30}$
  - (d)  $\frac{20}{7}$  (correct)
  - (e)  $\frac{11}{6}$
  - (f) None of the above.
2. Each member of a club is assigned into exactly one of two teams: blue team or red team. 35 members belong to the blue team while the red team consists of 30% of the club. How many members of the club are in the red team?
- (a) 117
  - (b) 46
  - (c) 50
  - (d) 15 (correct)
  - (e) 11
  - (f) None of the above
3. Solve:  $\frac{-11 + (-6)(-6)}{-5} =$
- (a) -20
  - (b) -5 (correct)
  - (c) -18
  - (d) 10
  - (e) -2
  - (f) None of the above.
4. Susan scored 77%, 60%, 86%, and 70% on the first four tests. What must she score on the fifth test to obtain an average test score of 69% for the five tests?
- (a) 50%
  - (b) 52% (correct)
  - (c) 53%
  - (d) 56%
  - (e) 64.75%
  - (f) None of the above
5. A newspaper employs 24 full-time reporters and 48 part-time reporters. What is the ratio of full-time reporters to the total number of reporters?
- (a) 1 : 2
  - (b) 3 : 1
  - (c) 1 : 3 (correct)
  - (d) 2 : 1
  - (e) 2 : 3
  - (f) None of the above
6. Find  $x$  if  $4 = \sqrt{2x - 4}$ .
- (a) 6
  - (b) 10 (correct)
  - (c) 4
  - (d) 7
  - (e) 0
  - (f) None of the above
7. If  $|x + 3| - 3 = 6$ , then  $x = ?$
- (a) 6 or -12 (correct)
  - (b) 12
  - (c) -6 or 12
  - (d) -6
  - (e) -12
  - (f) None of the above
8. If  $f(x) = 4x^2 + 5x + 8$ , then  $f(a - 1) =$
- (a)  $4a^2 - 3a + 7$  (correct)
  - (b)  $4a^2 + 13a + 7$
  - (c)  $4a^2 + 5a + 7$
  - (d)  $4a^2 + 5a - 1$
  - (e) 0
  - (f) None of the above

9. If  $f(x) = x^2 + 8x + 3$ , then  $f(-4) =$

- (a)  $-45$
- (b)  $-13$  (correct)
- (c)  $-37$
- (d)  $-33$
- (e)  $-12$
- (f) None of the above

10. Find the  $x$ -coordinates of the points in the  $xy$ -plane where the graph of the function  $y = x^2 + 3x - 3$  crosses the  $x$ -axis.

- (a)  $\frac{3 \pm \sqrt{21}}{2}$
- (b)  $\frac{3 \pm \sqrt{3}}{2}$
- (c)  $\frac{-3 \pm \sqrt{3}}{2}$
- (d)  $\frac{-3 \pm \sqrt{21}}{2}$  (correct)
- (e)  $\frac{-3 \pm \sqrt{37}}{2}$
- (f) None of the above

11. Solve for  $x$  :  $16^{3-9x} = 4^{8x}$

- (a)  $\frac{3}{13}$  (correct)
- (b)  $\frac{3}{25}$
- (c)  $\frac{6}{25}$
- (d)  $\frac{3}{17}$
- (e)  $0$
- (f) None of the above

12. If  $\frac{1}{8} \log(x) - \log(z) + 4 \log(y) = 0$ , solve for  $z$ .

- (a)  $\frac{x^{1/8}}{y^4}$
- (b)  $x^{1/8}y^4$  (correct)
- (c)  $\frac{xy}{2}$
- (d)  $\frac{1}{8}x + 4y$
- (e)  $x^{1/8} + y^4$

13. Simplify:  $\log_{20} 4 + \log_{20} 5 =$

- (a)  $\log_{20}(-1)$
- (b)  $\log_{20} 9$
- (c)  $2$
- (d)  $1$  (correct)
- (e)  $20$
- (f) None of the above

14. Solve the inequality  $\sqrt{x-4} + \sqrt{x-7} + 6 > 0$ .

- (a)  $[7, \infty)$  (correct)
- (b)  $[4, \infty)$
- (c)  $(-\infty, \infty)$
- (d)  $(7, \infty)$
- (e)  $[-7, \infty)$
- (f) No solution for  $x$ .

15. Suppose  $P = 8a^2 + 4b^2 - 8c^2$ ,  $Q = -3a^2 + 5b^2 + 2c^2$ , and  $P - Q + R = 0$ . Determine  $R$ .

- (a)  $11a^2 - b^2 - 10c^2$
- (b)  $5a^2 + 9b^2 - 6c^2$
- (c)  $-11a^2 - b^2 + 10c^2$
- (d)  $-11a^2 + b^2 + 10c^2$  (correct)
- (e)  $-11a^2 + b^2 - 10c^2$
- (f) None of the above

16. Which of the following five statements is wrong?

- (a) For  $b \geq 0$ ,  $\sqrt{b^3} = (\sqrt{b})^{\sqrt{3}}$  (correct)
- (b)  $\sqrt{(-3)^2} = 3$
- (c) For all  $b$ ,  $\sqrt{b^2} = |b|$
- (d)  $\sqrt[7]{(-3)^7} = -3$
- (e) For  $b \geq 0$ ,  $\sqrt{b^3} = (\sqrt{b})^3$

17. Solve for  $x$ :

$$\begin{aligned} 4x + 5y + 17 &= 0 \\ 8x + 8y - 7 &= 0 \end{aligned}$$

- (a)  $x = \frac{171}{8}$  (correct)
- (b)  $x = -\frac{19}{8}$
- (c)  $x = \frac{101}{8}$
- (d)  $x = -\frac{101}{8}$
- (e)  $x = -\frac{171}{8}$
- (f) None of the above

18. The polynomial  $P(x)$  divided by  $x^2 - 2x - 2$  gives the quotient  $x^3 + 4x - 2$  and the remainder  $4x - 3$ . Determine  $P(x)$ .

- (a)  $P(x) = x^5 - 2x^4 + 2x^3 - 10x^2 + 1$  (correct)  
 (b)  $P(x) = x^5 - 2x^4 - 2x^3 - 10x^2 + 1$   
 (c)  $P(x) = x^5 - 2x^4 + 2x^3 - 10x^2 + x + 1$   
 (d)  $P(x) = x^5 - 2x^4 + 2x^3 + 10x^2 + 1$   
 (e)  $P(x) = x^5 + 2x^4 + 2x^3 - 10x^2 + 1$   
 (f) None of the above

19. Solve for  $x$ :  $x^2 - 1 = 2x$ .

- (a)  $x = \frac{3}{2} \pm \sqrt{2}$   
 (b)  $x = 1 \pm \sqrt{2}$  (correct)  
 (c)  $x = -1 \pm \sqrt{2}$   
 (d)  $x = -\frac{1}{2} \pm \frac{\sqrt{2}}{2}$   
 (e)  $x = 2 \pm 2\sqrt{2}$   
 (f) None of the above

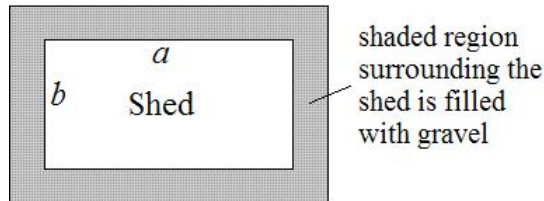
20. Rationalize the denominator:  $\frac{1}{2x + \sqrt{1 + 4x^2}}$ .

- (a)  $\sqrt{1 + 4x^2} - 2x$  (correct)  
 (b)  $-\sqrt{1 + 4x^2} - 2x$   
 (c)  $-\sqrt{1 + 4x^2} + 2x$   
 (d)  $\sqrt{1 + 4x^2} + 2x$   
 (e)  $\frac{\sqrt{1 + 4x^2} - 2x}{2x + 1 + 4x^2}$   
 (f) None of the above

21. Simplify:  $\frac{x-1}{x^2+3x+2} - \frac{4}{x^2-x-2} - \frac{x-8}{x^2-4}$ .

- (a)  $\frac{2}{(x+2)(x-2)}$   
 (b)  $-\frac{2}{(x+1)(x-2)(x+2)}$   
 (c)  $\frac{2}{(x+1)(x-2)(x+2)}$  (correct)  
 (d) 2  
 (e)  $\frac{2}{(x-2)(x-1)}$   
 (f) None of the above

22. A landscape architect wants to make an exposed gravel border of uniform width around a small shed. The shed has dimensions  $a = 12$  feet by  $b = 11$  feet (see figure below). She only has enough gravel to cover 24 square feet. Determine the required uniform border width.



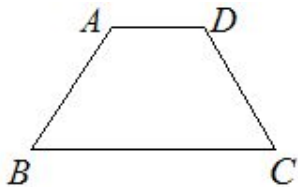
- (a)  $\frac{1}{2}$  feet (correct)  
 (b)  $\frac{1}{4}$  feet  
 (c)  $\frac{3}{2}$  feet  
 (d)  $\frac{9}{4}$  feet  
 (e) 1 foot  
 (f) None of the above
23. Find the slope of the line that passes through the points  $(1, 2)$  and  $(8, 8)$ .

- (a)  $\frac{6}{13}$   
 (b)  $\frac{7}{6}$   
 (c) 5  
 (d)  $\frac{6}{7}$  (correct)  
 (e)  $\frac{13}{6}$   
 (f) None of the above

24. The base of a right-triangle is 8 m, and the hypotenuse is 10 m. What is the length of the other leg?

- (a) 18 m
- (b) 80 m
- (c) 3 m
- (d) 6 m (correct)
- (e) 2 m
- (f) None of the above

25. See the trapezoid in the figure below. Given that the line segments AD and BC are parallel,  $AD = 3$  cm,  $\angle ABC = \angle DCB = 30^\circ$ , and  $\frac{AD}{BC} = \frac{1}{3}$ , find the area of the trapezoid in  $\text{cm}^2$ .



- (a)  $6 \text{ cm}^2$
- (b)  $6\sqrt{3} \text{ cm}^2$  (correct)
- (c)  $8 \text{ cm}^2$
- (d)  $\frac{7}{2} \text{ cm}^2$
- (e)  $7 \text{ cm}^2$
- (f) None of the above

26. What is the area of a right-triangle if one leg is 5 m long and the other leg is 9 m long?

- (a)  $14 \text{ m}^2$
- (b)  $7 \text{ m}^2$
- (c)  $45 \text{ m}^2$
- (d)  $22.5 \text{ m}^2$  (correct)
- (e)  $10 \text{ m}^2$
- (f) None of the above

27. What is the period of the function  $y = \tan\left(\frac{x}{4}\right)$ ?

- (a)  $4\pi$  (correct)
- (b)  $8\pi$
- (c)  $\frac{\pi}{8}$
- (d)  $\frac{\pi}{4}$
- (e)  $\pi$
- (f) None of the above

28. Which of the following statements is false?

- (a) For all  $\alpha$  where  $\cos \alpha$  is nonzero,  $\sec^2 \alpha \cdot (1 - \sin^2 \alpha) = 1$ .
- (b) For all  $\alpha$ ,  $\sin\left(\frac{\pi}{2} + \alpha\right) = -\cos \alpha$ . (correct)
- (c) For all  $\alpha$  where  $\sin \alpha$  is nonzero,  $\tan\left(\frac{\pi}{2} + \alpha\right) = -\cot \alpha$ .
- (d) For all  $\alpha$ ,  $\cos(2\alpha) = 2\cos^2 \alpha - 1$ .
- (e) For all  $\alpha$  where  $\sin \alpha$  is nonzero,  $\tan\left(\frac{\pi}{2} - \alpha\right) = \cot \alpha$ .
- (f) None of the above

29. In the right triangle  $\triangle ABC$ ,  $\angle C = 90^\circ$  and  $\angle A = 45^\circ$ . What is the value of  $\sin A + \sin B$ ?

- (a)  $\sqrt{2}$  (correct)
- (b)  $\frac{1 + \sqrt{2}}{2}$
- (c)  $\frac{\sqrt{2}}{2}$
- (d) 1
- (e)  $\frac{1}{4}$
- (f) None of the above.

30. Find the value of  $\sqrt{2} \cos\left(\frac{\pi}{4}\right) - \cos\left(\frac{\pi}{3}\right) \tan\left(\frac{\pi}{3}\right) + \sqrt{3} \tan\left(\frac{\pi}{6}\right)$

- (a)  $4 - \sqrt{2}$
- (b)  $\frac{4 - \sqrt{3}}{2}$  (correct)
- (c)  $\frac{3 - \sqrt{2}}{2}$
- (d)  $\frac{4 - \sqrt{2}}{2}$
- (e)  $\frac{4 - \sqrt{2}}{3}$
- (f) None of the above