31. Which of the following has $x-3$ as a factor?

I.	$2x^2-5x-3$
II.	$2x^2-18$
III.	x^2+x-6
IV.	$2xa-6a-x^2+3x$

$2x+1$ / $x+3$

$2(x^2-9) = 2(x+3)(x-3)$ (eliminates B)

$(x+3)(x-2)$ - (eliminates B, D)

$2a(x-3) - x(x-3)$

$= (x-3)(2a-x)$

↳ Tough factoring question!

A. I and II only
B. III and IV only
C. I, II and IV only
D. I, II, III and IV

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

$7x$: $6x$ / 1 ; x / 1

$-7x$: $6x$ / -1 ; x / -1

$5x$: $2x$ / 1 ; $3x$ / 1

$-5x$: $2x$ / -1 ; $3x$ / -1

A. 5, 7 only
B. ± 5, ± 7 only
C. -5, -7 only
D. all integers between -7 and 5, inclusive

33. What value of k will make the following trinomial a perfect square?

$$2kx^2-24xy+9y^2$$

Record your answer neatly on the Response Form.

$(4x-3y)(4x-3y)$ ~ Must be identical

$= 16x^2-24xy+9y^2$

$\therefore 2k = 16$

$k = 8$

Match each Expression on the left with the correct Expanded Form on the right. Each Expanded Form may be used once, more than once or not at all.

Expression	Expanded Form
D 34. $(a+x)(a-x) = a^2 - x^2$	A. $x^2 - a^2$
F 35. $(x+a)^2 = x^2 + 2ax + a^2$	B. $x^2 + a^2$
D 36. $-(x+a)(x-a) = -(x^2 - a^2)$ $= a^2 - x^2$	C. $-x^2 + 2ax - a^2$
	(D.) $a^2 - x^2$
	E. $x^2 - 2ax - a^2$
	(F.) $x^2 + 2ax + a^2$
	G. $-x^2 - a^2$

Use the following information to answer question 37.

Jane and Harry are asked to determine the value for which the expression $\frac{6x-12}{x-2}$ is undefined.

$$\frac{6x-12}{x-2}$$
$$= \frac{6\cancel{(x-2)}}{\cancel{(x-2)}}$$
$$= 6$$

Here are their responses.

Jane: The expression is undefined when $x = 2$ because the original expression is undefined when $x = 2$.

Harry: No, since we cancel the $(x-2)$'s, there are no restrictions.

37. Jane is correct.

A. True
B. False

---

38. For what values of x is the following expression undefined?

$$\frac{4x^2-25}{4x^2-10x-50} = \frac{(2x+5)(2x-5)}{2(2x^2-5x-25)} \qquad \frac{2x+5}{x-5}$$
$$= \frac{4x^2-25}{2(2x+5)(x-5)}$$
$$\therefore x \neq \frac{-5}{2}, 5$$

A. $x = 5$

B. $x = \frac{5}{2},\ 5$

C. $x = -\frac{5}{2},\ 5$

D. $x = 0,\ -\frac{5}{2},\ 5$

39. Simplify:

$$\frac{8x^2-12x+16}{-4} = -2x^2+3x-4$$

A. $-2x^2+3x-4$
B. $-2x^2-3x+4$
C. $-2x^2-3x-4$
D. $-2x^2+3x+4$

40. Simplify:

$\frac{2x^2-8x+6}{x-3}$; for all permissible values of x.

A. $x-1$
B. $x+1$
C. $2x-2$
D. $2x+2$

$$= \frac{2(x^2-4x+3)}{(x-3)}$$

$$= \frac{2(x-3)(x-1)}{(x-3)}$$

41. A number is multiplied by 3 and then 2 is subtracted. 50 is divided by this result. The same number is multiplied by 4 and then 4 is added. 100 is divided by this result. If both quotients are the same, what is the number?

Record your answer neatly on the Response Form.

$$\frac{50}{3x-2} = \frac{100}{4x+4}$$

$$200x+200 = 300x-200$$

$$400 = 100x$$

$$4 = x$$

42. Simplify:

$$\frac{1}{x}+\frac{3}{x},\ x\neq 0$$

A. $\frac{4}{x}$

B. $\frac{4}{2x}$

C. $\frac{3}{2x}$

D. $\frac{3}{x^2}$

43. Simplify:

$$\frac{a^2+7a+10}{a^2-2a-35}\div\frac{a^2+a-2}{a^2-10a+21}$$; for all permissible values of a.

A. $\frac{a-1}{a-3}$

B. $\frac{a-3}{a-1}$

C. $\frac{a+1}{a-3}$

D. $\frac{a+3}{a-1}$

$$\frac{(a+5)(a+2)}{(a-7)(a+5)}\cdot\frac{(a-7)(a-3)}{(a+2)(a-1)}$$

44. Solve:

$$\frac{3x+1}{2x} = \frac{6x-5}{4x-3} \text{ ; where } x \neq 0, \frac{3}{4}$$

A. 3, 5

B. $\frac{3}{5}$

C. $\frac{5}{3}$

D. -5

$12x^2 - 5x - 3 = 12x^2 - 10x$

$5x = 3$

$x = \frac{3}{5}$

45. When $6y^3 + 2y^2 - 5$ is divided by $3y+1$, the quotient is $2y^2$ and the remainder is -5. Which of the following represents these results?

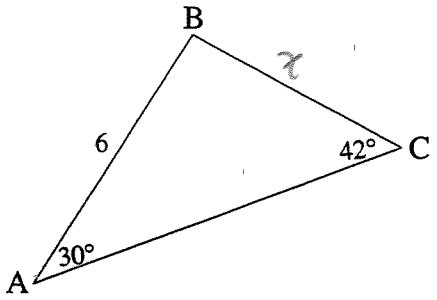
A. $\frac{6y^3 + 2y^2 - 5}{2y^2} = 3y + 1 + 5$

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

C. $6y^3 + 2y^2 - 5 = 2y^2 - \frac{5}{3y+1}$

D. $6y^3 + 2y^2 - 5 = (3y+1)(2y^2) - 5$

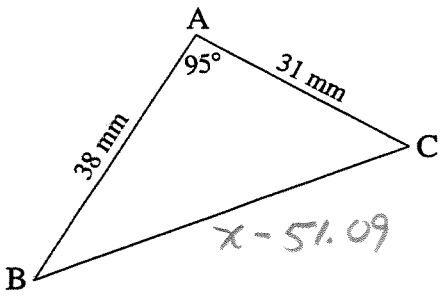
Use the following diagram to answer question 46.



46. Which of the following is used to find the length of side BC?

A. sine law
B. cosine law
C. distance formula
D. pythagorean theorem

Use the following diagram to answer questions 47 and 48.



47. What is the length of $\overline{BC}$?

$x^2 = 38^2 + 31^2 - 2(38)(31)\cos 95^\circ$

A. 37 mm
B. 38 mm
C. 51 mm
D. 58 mm

48. What is the measure of $\angle B$?

$\cos B = \frac{31^2 - 38^2 - 51^2}{-2(38)(51)}$

$\angle B = 37.3^\circ$

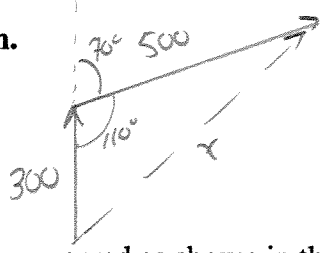
A. 27°
B. 37°
C. 48°
D. 58°

49. A ship leaves port and travels due north for 300 km. It then changes course and travels N70°E (bearing 70°) for 500 km. How far is the ship (in kilometres) from its starting point? Answer to one decimal place.

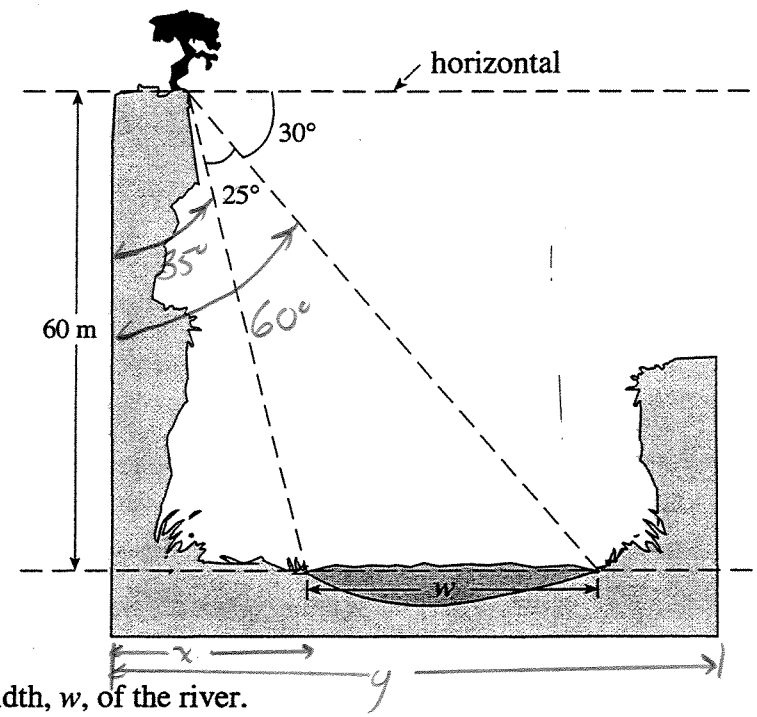
Record your answer neatly on the Response Form.

$x^2 = 300^2 + 500^2 - 2(300)(500)\cos 110°$

$x = 665.29 \doteq 665.3$ km



50. From the top of a cliff 60 m above a river, angles are measured as shown in the diagram below.



Calculate the width, w, of the river.

A. 28 m
B. 62 m
C. 73 m
D. 104 m

$\tan 35° = \frac{x}{60}$ $\quad \tan 60° = \frac{y}{60}$

$x = 42.01$ $\quad 103.92 = y$

$\therefore w = y - x$

$= 61.9$ m or 62 m

Use the following information to answer question 51.

$d_{UV} = \sqrt{(3)^2+(3^2)}$
$= \sqrt{18}$

Line Segment UV	Line Segment XY
U(2, 5), V(6, 8)	X(–3, 4), Y(–7, 1)

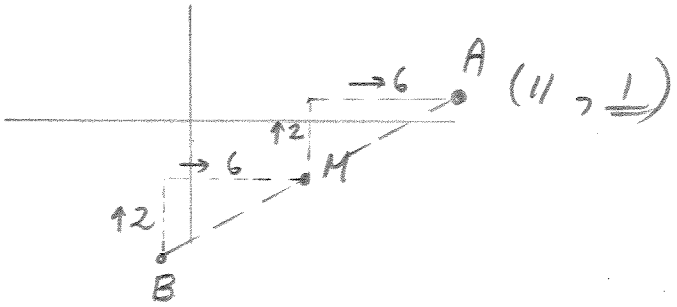
$d_{XY} = \sqrt{3^2+3^2}$
$= \sqrt{18}$

51. Which of the following statements is correct?

A. The length of line segment UV is greater.
B. The length of line segment XY is greater.
C. The lengths of the two line segments are the same.
D. There is not enough information given to determine the lengths of the line segments.

52. The midpoint of line segment AB is M(5, –3). If the coordinates of B are (–1, –7) and the coordinates of A are (x, y), what is y?

A. –5
B. 1
C. 2
D. 11



53. When the radius of a sphere is doubled, its volume is also doubled.

A. True
B. False

$V = \frac{4\pi r^3}{3}$ $V = \frac{4\pi(2r)^3}{3}$

$V = \frac{4\pi(8r^3)}{3}$

Use $r=1$ and compare to $r=2$

$V = \frac{4\pi(1)^3}{3}$ $V = \frac{4\pi(2)^3}{3}$

$V = 4.19$ $V = 33.51$

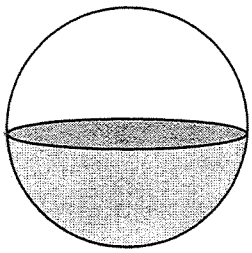
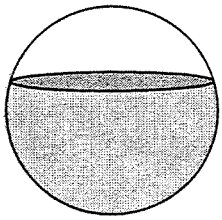
$\therefore$ Not a factor of 2

54. The rounded value 0.6820 is a trigonometric ratio for an angle $A(0° \le A \le 180°)$. Which of the following has the given value?

I.	$\cos 133°$
II.	$\sin 43°$
III.	$\sin 137°$
IV.	$\cos 47°$

A. I and IV only
B. II and IV only
C. I, II and III only
D. II, III and IV only

Use the following information to answer question 55.

Sphere 1	Sphere 2
	
$\frac{1}{2}$ full of water	$\frac{3}{4}$ full of water

55. What must the radius be, in centimetres, of Sphere 1 in order for there to be an equal volume of water in each sphere? Answer to two decimal places.

Record your answer neatly on the Response Form.

Sphere 2

$V = \frac{4}{3}\pi(30)^3$

$V = 113097.3$

$\frac{3}{4}V = 84823.0$

$\frac{3}{4}V_2 = \frac{1}{2}V_1$

$\therefore \frac{1}{2}V_1 = 84823.0$

$\therefore V_1 = 169646.0 = \frac{4\pi r^3}{3}$

$40500 = r^3$

$34.34 = r$

56. Determine the value of x if the slope of a line is $\frac{1}{2}$ and the line passes through the points $(-6, 2)$ and $(x, 10)$.

A. -2
B. 6
C. 10
D. 22

$\frac{10-2}{x+6} = \frac{1}{2}$

$\frac{8}{x+6} = \frac{1}{2}$

$16 = x+6$

$10 = x$

Ugly!

Match each Description on the left with its Equation on the right. Each Equation may be used once, more than once or not at all.	
Description	**Equation**
H 57. line through $(3, -1)$ and $(-3, 3)$	A. $3x-2y+4=0$
D 58. line with slope $m=-\frac{2}{3}$ through $(6, -2)$	B. $2x-3y+3=0$
B 59. line with a y-intercept of 1 passing through $(3, 3)$	C. $2x-3y+6=0$
	D. $2x+3y-6=0$
	E. $2x+3y+3=0$
	F. $3x+2y-2=0$
	G. $3x-2y+2=0$
	H. $2x+3y-3=0$

57. $m = \frac{4}{-6}$

$m = -\frac{2}{3}$

$-1 = -\frac{2}{3}(3)+b$

$-1 = -2+b$

$1 = b$

$\therefore [y = -\frac{2}{3}x+1]^3$

$3y = -2x+3$

$2x+3y-3=0$

58. $-2 = -\frac{2}{3}(6)+b$

$-2 = -4+b$

$2 = b$

$\therefore [y = -\frac{2}{3}x+2]^3$

$3y = -2x+6$

$2x+3y-6=0$

59. $3 = 3m+1$

$2 = 3m$

$\frac{2}{3} = m$

$\therefore [y = \frac{2}{3}x+1]^3$

$3y = 2x+3$

$0 = 2x-3y+3$

60. Line ℓ contains points $P(3, -9)$ and $Q(-3, -5)$. Choose the equations of the lines that are parallel and perpendicular to line ℓ.

	Parallel to line ℓ	Perpendicular to line ℓ
A.	$y = -\frac{2}{3}x - 10$	$y = \frac{3}{2}x + 12$
B.	$y = -\frac{2}{3}x - 8$	$y = -\frac{3}{2}x - 12$
C.	$y = -\frac{3}{2}x + 10$	$y = \frac{3}{2}x - 4$
D.	$y = \frac{3}{2}x - 9$	$y = -\frac{2}{3}x + 17$

$m_{PQ} = \frac{-5+9}{-3-3}$

$= \frac{4}{-6}$

$m_{PQ} = -\frac{2}{3}$ $\perp$ $m = \frac{3}{2}$

END OF EXAMINATION