

**LINEAR INEQUALITY**

**VARIABLE**

**UNIQUE SOLUTION**

**SUBSTITUTION**

**LINEAR PROGRAMMING**

**PERMUTATION**

**SOLVING SIMULTANEOUS  
EQUATIONS**

**REARRANGING**

**BINOMIAL THEOREM**

**EXPONENT RULES**

**EQUATIONS WITH THREE  
UNKNOWNNS**

**BINOMIAL**

**COEFFICIENTS**

**COMBINATIONS**

**ELIMINATION**

**CONSTRAINT**

**OPTIMAL SOLUTION**

**LOG RULES**

**FACTORISING**

**SHADING**

**INCONSISTENT EQUATIONS**

**BOUNDARY**

**VERTICES**

**CHANGE THE SUBJECT OF  
THE FORMULA**

ARITHMETIC

SUM TO INFINITY

FIRST TERM

OSCILLATING

COMMON RATIO

$r$

DECREASING

PROPERTIES OF  $\Sigma$  NOTATION

CONVERGENT

$e^x$

EXPONENTIAL

nTH TERM

GEOMETRIC

COMMON DIFFERENCE

$S_n$

DIVERGENT

GENERAL TERM

INCREASING

LIMIT

SEQUENCE

$\Sigma$

$d$

$a$

$a+(n-1)d$

COMMON DIFFERENCE

SERIES

$t_n$

**EXPONENTIAL FUNCTION**

$$y = Ae^{bx}$$

**LINEAR****ASYMPTOTE****TURNING POINT****SEMI-LOG GRAPHING****MODELLING****PARABOLA****PIECEWISE****DECAY CURVE****RATIONAL****CUBIC FUNCTION****GROWTH CURVE****SYMMETRY****LOGARITHMIC FUNCTION****LOG-LOG GRAPHING****STEP FUNCTION****INTERCEPTS****POWER LAWS**

$$y = x^a$$

**LINEARISING****MINIMUM POINT****DISCONTINUITIES****GRADIENT**

**MEAN**

**LEVEL OF SIGNIFICANCE**

**CENTRAL LIMIT THEOREM**

**POPULATION**

**NORMAL**

**HYPOTHESIS TESTING**

**UNION**

**STANDARD DEVIATION**

**APPROXIMATION**

**POISSON**

**CONDITIONAL PROBABILITY**

**INDEPENDENT**

**TEST STATISTIC**

**PARAMETER**

**STANDARD NORMAL  
DISTRIBUTION**

**SAMPLE**

**INTERSECTION**

**DISCRETE RANDOM  
VARIABLE**

**DISJOINT**

**PROPORTION**

**CONFIDENCE INTERVALS**

**STANDARD ERROR**

**EXPECTATION**

**PROBABILITY**

**BINOMIAL**

**NULL HYPOTHESIS**

**COMPLEMENTARY**

**STATISTICS**

**SET THEORY**

# Answers

## Mix and Match

### P1 Combinations, Permutations and Others:

A c 2,5,7,12

B a 1,4,8,10

C b 3,6,9,11

A 2. 3628800

B 1. 6

C 3. 15625

5. 720

4. 8855

6. 360

7.  ${}^4P_4 \times {}^5P_5 \times 6 = 17280$

8.  ${}^6C_3 \times 3! \times 3! = 160$

9. 48

12. 1680

10. 38760

11. 59049

### P3 Piecewise Functions:

A 3,4,9,10

B 1,6,8,11

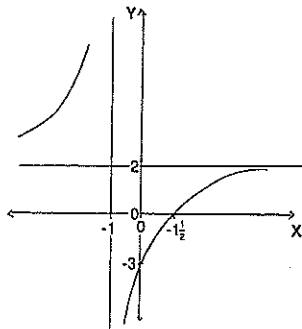
C 2,5,7,12

### P4 Hyperbolas:

1. A 1,5,7,10

B 2,3,9,12

C 4,6,8,11



$$y = \frac{2x-3}{x+1}$$

2.

### P5 Algebra:

A 6,7,10,11

B 2,8,14,16

C 1,3,5,13

D 4,9,12,15

6.  $(2t+3)(2t-3)$

7.  $(x+3)(2x-y)$

10.  $(x+6)(x-3)$

11.  $(2m-3t)(3k-g)$

2.  $b^{2n-1}$

8.  $\frac{x+2}{y}$

14.  $\frac{3\sqrt{x}}{2y}$

16.  $10gx^3y^2$

1.  $\theta \approx \frac{2A}{r^3}$

3.  $a = \frac{2s}{n} - \ell$

5.  $a \approx \frac{bx^2}{b+x^2}$

13.  $\ell = \frac{T^2g}{4\pi^2}$

4.  $x = -1, 10$

9. 137641

12. -0.03

15. 1.70, -0.07 (2dp)

1. (i)  $6\sqrt{3}m^2$  (ii) 17.7cm (iii) Hint: use triangles from the centre to the vertices.

2. (i)  $r = \frac{V-d}{dt}$  (ii) \$2280 (iii)  $t = \frac{V-d}{dr}$

### P6 Simultaneous Equations with Inconsistent Solutions:

A 5,7,10,11

B 2,3,8,12

C 1,4,6,9

### P7 Linear Programming:

A 5,11,20,23

D 9,13,18,21

B 3,14,15,24

E 1,2,4,10

C 7,8,16,17

F 6,12,19,22

### P9 Curve Fitting:

A 4,5,8,12 (a)  $y = 0.9x + 50$

B 1,7,10,11 (b)  $y = 16e^{0.1x}$

C 2,3,6,9 (c)  $y = 3.7x^{\frac{1}{2}}$

### P11 Numerical Methods for Solving Equations:

A c,2,6,7,8

B b,1,5,9,10

C a,3,4,11,12

a

$x_0$	$y_0$	$x_1$	$y_1$
0.5	-0.1487	1.0	0.2817
1.0	0.2817	0.6727	0.0586
0.6727	0.0586	0.5867	-0.0379
0.5867	-0.0379	0.6205	0.0016
0.6205	0.0016	0.6191	-0.0000

b

$x_1$	$y_1$	$y_1'$
0.5	-0.1487	1.3513
0.6100	-0.0103	1.1596
0.6190	-0.000	

c

$x_0$	$y_0$	$x_1$	$y_1$	$x_2$	$y_2$
0.5	-0.1487	1.0	0.2817	0.75	0.1330
0.5	-0.1487	0.75	0.1330	0.625	0.0068
0.5	-0.1487	0.625	0.0068	0.5625	-0.0676
0.5625	-0.0676	0.625	0.0068	0.5938	-0.0295
0.5938	-0.0295	0.625	0.0068	0.6094	-0.0111

**P13 Functions and Gradient Functions:**

- A 1,2,7,8    Z  
 B 4,5,6,11    Y  
 C 3,9,10,12    X

**Problems:**

- 1 (i) T    eg     $y = 5x, y=5x+3$   
 (ii) F    eg     $y = x^2; x \geq 0$  has  $y' = 0$  at  $x = 0$   
 (iii) T  
 (iv) F    eg    A page 13  
 (v) F    eg     $y = (x-1)(x+1)^2$   
 (vi) F     $y = \log x$

**P15 Data Displays and Values:**

- A 3,8,10,12    c  
 B 1,2,5,9    b  
 C 4,6,7,11    a

**P17 Binomial, Normal and Poisson Distributions (1):**

- A c,e,4,6,7,10  
 B a,d,1,2,9,11  
 C b,f,3,5,8,12

4. 0.0640    1. 0.011    3. 0.0025  
 6. 0.4408    2. 0.0228    5. 0.2725  
 7. 0.8497    9. 0.7881    8. 0.6671  
 10. 0.0381    11. 0.937    12. 0.2707

**P19 Binomial, Normal and Poisson Distributions (2):**

- A 6,9,10,12, b  
 B 3,7,8,11, c  
 C 1,2,4,5, a

x: Binomial approximated by Poisson. 0.0697

y: Binomial approximated by normal. 0.1587

z: Poisson approximated by normal. 0.7552

**P21 Sample and Population Statistics:**

- A 2,5,7,8  
 B 1,3,4,6  
 1. b,f    2. a,c,d,i    3. k,l    4. e    5. b, f    6. a,d, i  
 7. g,h,    8. c,j

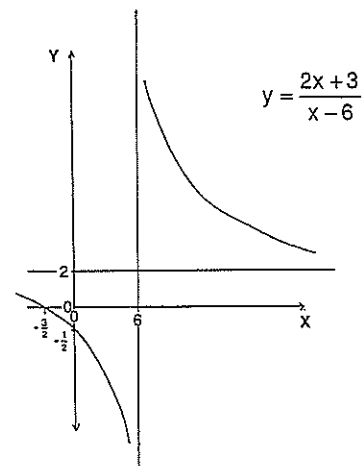
**P22 Sequences and Series:**

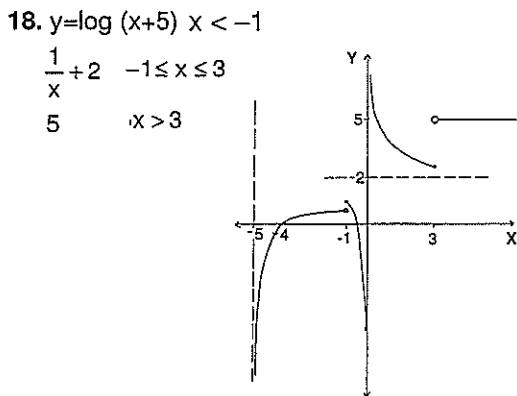
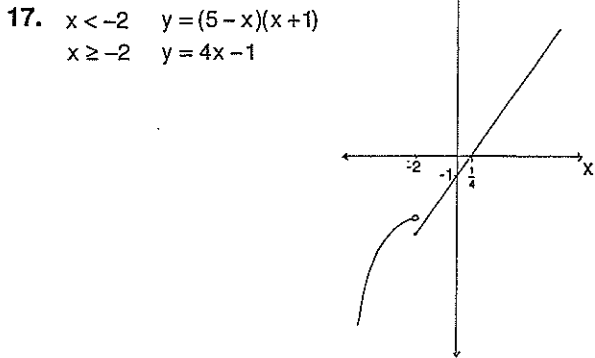
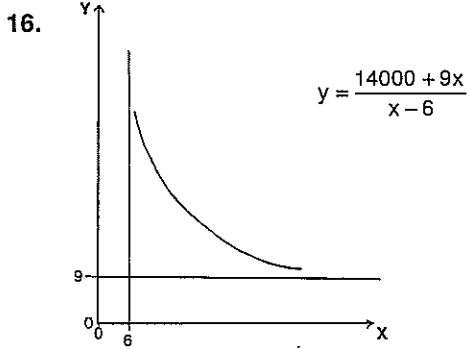
S= sequence    R=series

- A 2S,3R,8R,14R  
 B 1S,6R,7R,12R  
 C 5R,9R,13S,15S  
 D 4S,10R,11S,16R

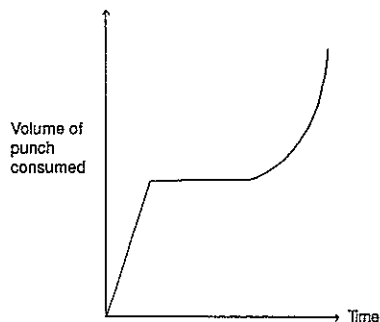
**Information Sharing**

1. 7.5cm, 7.5cm  
 2. ① meets path at (2,0), (14,0)  
    area= 288m<sup>2</sup>  
    ② x=8m, y=36m  
 3. x=15m, y=17.5m  
 4.  $P=120000e^{0.01258t}$   
    198481 people  
 5.  $c=0.001e^{-0.5108t}$   
     $4\frac{1}{2}$  hrs  
 6.  $K=-0.02554$   
    35.88 minutes  
 9. 245 is not magic  
 12. 3.7m  
 13. (i) 22.35m  
    (ii) 42  
 14. 66021  
    last biscuit in 25th month after counselling began  
 15.



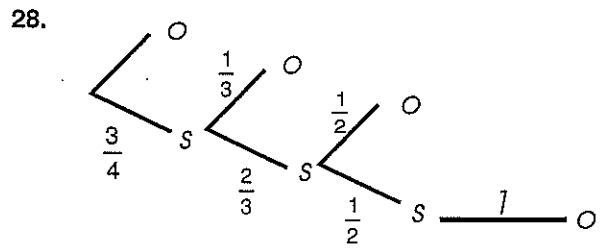


19. values and equations will vary from group to group.



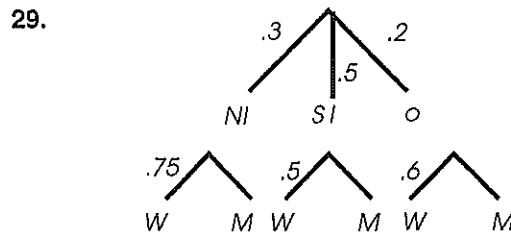
20. ①  $-224000x^3$   
 ②  $1750000$
21. ①  $537824, 384160x$   
 $32, 1120x$   
 ②  $(2 + 14x)^5$
22.  $(x, y, z) = (1.5, 3.6, -1.8)$
23. Louis; 2, Sarah; 6, Joe; 7
24.  $11.009 \leq \mu \leq 11.790$
25.  $247.6 \leq \mu \leq 250.4$  90%  
 $247.4 \leq \mu \leq 250.6$  95%
26.  $-0.0282 \leq \mu_1 - \mu_2 \leq 0.0682$

27. a)  $0.555 \leq \pi \leq 0.645$   
 b)  $0.7313 \leq \pi \leq 0.8086$



x	1	2	3	4
$P(X=x)$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

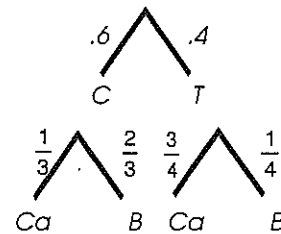
$E[x] = 2.5$  Keys



(i)  $p(w) = 0.608$

(ii)  $p(SI/W) = 0.411$

30.



$p(C/Ca) = 0.4$

31. average winning = \$2.70  
 average return = \$0.80
32. 0.3786
33. 0.1613
34. ① 0.0516, 0.1564  
 ② 0.1755, 0.5595
35.  $\mu = 12, 0.5384$