1. The expression $x^2 - 6x + 14$ can be written in the form $(x - p)^2 + q$, for all values of x.

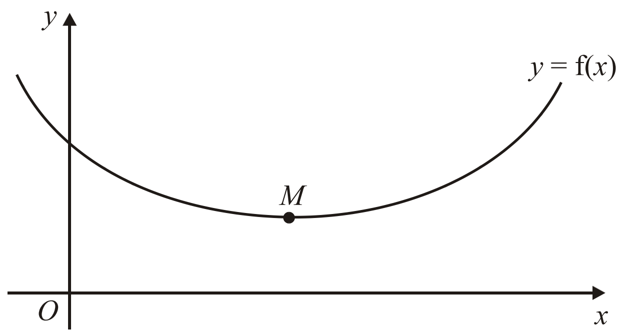
(a) Find the value of (i) p, (ii) q.

(i) p = ……………………

(ii) q = ……………………

(3)

The equation of a curve is $y = \text{f}(x)$, where $\text{f}(x) = x^2 - 6x + 14$.
Here is a sketch of the graph of $y = \text{f}(x)$.

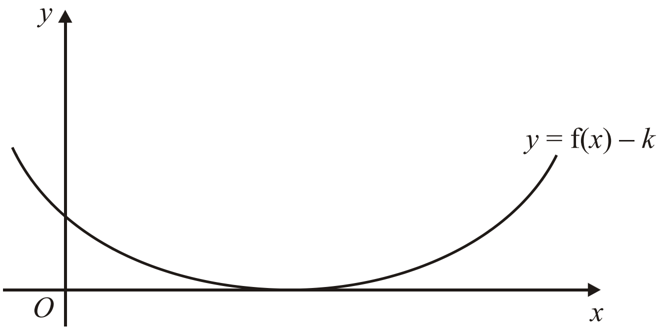


(b) Write down the coordinates of the minimum point, M, of the curve.

…………………………………

(1)

Here is a sketch of the graph of $y = f(x) - k$, where k is a positive constant.
The graph touches the x-axis.



(c) Find the value of k.

$k =$ ....

(1)

(d) For the graph of $y = f(x - 1)$,

(i) write down the coordinates of the minimum point,

....

(ii) find the coordinates of the point where the curve crosses the y-axis.

....

(3)
(Total 8 marks)

2. (a) Factorise

$$9x^2 - 6x + 1$$

....

(2)

(b) Simplify

$$\frac{6x^2 + 7x - 3}{9x^2 - 6x + 1}$$

....

(3)
(Total 5 marks)

3. (a) Factorise $x^2 - 3x$

....

(2)

(b) Simplify $k^5 \div k^2$

....

(1)

(c) Expand and simplify

(i) $4(x + 5) + 3(x - 7)$

....

(ii) $(x + 3y)(x + 2y)$

....

(4)

(d) Factorise $(p + q)^2 + 5(p + q)$

....

(1)
(Total 8 marks)

4. (a) Simplify $k^5 \div k^2$

....

(1)

(b) Expand and simplify

(i) $4(x + 5) + 3(x - 7)$

....

(ii) $(x + 3y)(x + 2y)$

....

(4)

(c) Factorise $(p + q)^2 + 5(p + q)$

....

(1)

(d) Simplify $(m^{-4})^{-2}$

....

(1)

(e) Simplify $2t^2 \times 3r^3t^4$

....

(2)
(Total 9 marks)

5. (a) (ii) Factorise $2x^2 - 35x + 98$

....

(ii) Solve the equation $2x^2 - 35x + 98 = 0$

....

(3)

A bag contains (n + 7) tennis balls.
n of the balls are yellow.
The other 7 balls are white.

John will take at random a ball from the bag.
He will look at its colour and then put it back in the bag.

(b) (i) Write down an expression, in terms of n, for the probability that John will take a white ball.

....

Bill states that the probability that John will take a white ball is $\frac{2}{5}$

(ii) Prove that Bill's statement cannot be correct.

(3)

After John has put the ball back into the bag, Mary will then take at random a ball from the bag. She will note its colour.

(c) Given that the probability that John and Mary will take balls with **different** colours is $\frac{4}{9}$, prove that $2n^2 - 35n + 98 = 0$

(5)

(d) Using your answer to part (a) (ii) or otherwise, calculate the probability that John and Mary will both take white balls.

....

(2)
(Total 13 marks)

6. (a) Solve $\frac{40 - x}{3} = 4 + x$

x = ...

(3)

(b) Simplify fully $\dfrac{4x^2 - 6x}{4x^2 - 9}$

....

(3)
(Total 6 marks)

7. Factorise

$$x^2 + 7x + 6$$

....

(Total 2 marks)

8. Simplify $\dfrac{4x^2 - 9}{2x^2 - 5x + 3}$

....

(Total 3marks)

9. (a) Simplify $a^3 \times a^4$

……………………

(1)

(b) Simplify $3x^2y \times 5xy^3$

……………………

(2)

(c) Simplify $\dfrac{(x-1)^2}{x-1}$

……………………

(1)

(d) Factorise $x^2 - 9$

....

(1)
(Total 5 marks)

10. (a) Simplify $a^3 \times a^4$

....

(1)

(b) Simplify $3x^2y \times 5xy^3$

....

(2)

(c) Simplify $\frac{(x-1)^2}{x-1}$

....

(1)

(d) Factorise $a^2 - 9b^2$

……………………

(2)
(Total 6 marks)

11. Simplify fully

(a) $(3xy^2)^4$

…………………….

(2)

(b) $\dfrac{x^2 - 3x}{x^2 - 8x + 15}$

…………………….

(3)
(Total 5 marks)

12. Simplify fully $\frac{25 - x^2}{25 + 5x}$

....
(Total 3 marks)

13. (a) Factorise $x^2 + 6x + 8$

....
(2)

(b) Solve $x^2 + 6x + 8 = 0$

x =..........................

or x =..........................
(1)
(Total 3 marks)

14. (a) Factorise $2x^2 - 7x + 6$

....
(2)

(b) (i) Factorise fully $(n^2 - a^2) - (n - a)^2$

....

n and a are integers.

(ii) Explain why $(n^2 - a^2) - (n - a)^2$ is always an even integer.

....

....

....

(4)
(Total 6 marks)

15. (a) Expand $x(3 - 2x^2)$

....

(2)

(b) Factorise completely $12xy + 4x^2$

....

(2)

(c) Simplify $\frac{20a^2}{4ab^2}$

....

(2)

(d) Simplify $\frac{x-3}{x^2-9}$

....

(2)
(Total 8 marks)

16. (a) Expand and simplify $(x + 3)(x - 4)$

....

(2)

(b) Expand and simplify $(2x + 5)(3x - 4)$

....

(2)

(c) Factorise $x^2 + 7x + 10$

....

(2)

(d) Simplify fully $3p^5q \times 4p^3q^2$

....
(2)

(e) $p = 3t + 4(q - t)$

Find the value of q when $p = 6$ and $t = 5$

q = ...
(3)
(Total 11 marks)

17. (a) Factorise completely $3a^2 - 6a$

....
(2)

(b) Make q the subject of the formula $P = 2q + 10$

q = ...
(2)

(c) Expand and simplify $(y + 3)(y - 4)$

....
(2)

(d) Factorise $4p^2 - 9q^2$

....

(2)
(Total 8 marks)

18. (a) Factorise fully $6x^2 + 9xy$

....

(2)

(b) Expand and simplify $(2x + 5)(x - 2)$

....

(2)
(Total 4 marks)

19. (a) Expand and simplify

$(x - 6)(x + 4)$

....

(2)

(b) Factorise completely

$12x^2 - 18xy$

....

(2)
(Total 4 marks)

20. (a) Simplify fully

$$\frac{2x^2 - 3x}{4x^2 - 9}$$

....

(Total 3 marks)

21. (i) Factorise $x^2 - 7x + 12$

....

(ii) Solve the equation

$$x^2 - 7x + 12 = 0$$

....

(Total 3 marks)

22. (a) Factorise $x^2 + x$

………………..

(1)

(b) Factorise $y^2 - 2y - 35$

……………………………….

(2)

(Total 3 marks)

23. Factorise $x^2 + 2x - 15$

…………………………..
(Total 2 marks)

24. Factorise $x^2 - 5x - 14$

…………………………..
(Total 2 marks)

25. Simplify

$$\frac{x^2(5+x)}{x^2-25}$$

……………………

(Total 2 marks)

26. (a) Expand and simplify $(3x + 2)(4x + 1)$

....

(2)

(b) Factorise completely $3x^2 + 6xy$

....

(2)

(Total 4 marks)

27. (a) Factorise completely $2(x - 5)^2 + 3(x - 5)$

....
(2)

(b) Simplify $\frac{3(y-4)}{(y-4)^2}$

....
(1)
(Total 3 marks)

28. Factorise $y^2 + 3y - 10$

....
(Total 2 marks)

29. Factorise $x^2 + 6x + 8$

……………………….

(Total 2 marks)

30. Factorise fully $8x^2 - 12xy$

....

(Total 2 marks)

31. Simplify fully $\frac{3x+6}{x^2-4}$

....

(Total 3 marks)

32. (a) Simplify $4e \times 3f$

.... **(1)**

(b) Factorise $5x + 15$

.... **(1)**

(c) Simplify $2(r + 3) + 3(2r + 1)$

.... **(2)**

(Total 4 marks)

33. (a) Factorise $8p - 6$

.... **(1)**

(b) Factorise completely $y^3 - y^2$

.... **(2)**

(c) Expand and simplify $(e + 3)(e + 4)$

....

(2)
(Total 5 marks)

34. Simplify $\dfrac{x^2 + 5x + 6}{x + 2}$

....

(Total 3 marks)

35. Prove that $(n + 2)^2 - (n - 2)^2 = 8n$ for all values of n.

(Total 2 marks)

36. (a) Expand $3(5p - 2)$

....
(1)

(b) Expand and simplify $3(2x + 1) + 2(3x - 1)$

....
(2)

(c) Factorise $a^2 - 16a + 64$

....
(2)
(Total 5 marks)

37. (a) Expand $3(x + 2)$

....
(1)

(b) Factorise $5t + 20$

....
(1)
(Total 2 marks)

38. Factorise $x^2 + 2x - 15$

....
(Total 2 marks)

39. Simplify fully $\dfrac{4a-20}{a^2-25}$

....
(Total 3 marks)

40. Factorise $x^2 - 25x$

$(x-5)^2$	$x(x^2-25)$	$x(x^2-5)$	$x(x-25)$	$(x-5)(x+5)$
☐	☐	☐	☐	☐
A	**B**	**C**	**D**	**E**

(Total 1 mark)

41. Factorise completely $6x^2 + 8xy$

$2(3x^2+4xy)$	$2x^2(x+4y)$	$x(6x+8y)$	$2x(3x+4y)$	$6x(x^2+8y)$
☐	☐	☐	☐	☐
A	**B**	**C**	**D**	**E**

(Total 1 mark)

42. Factorise $6x^2 + x - 12$

$(2x - 3)(3x + 4)$	$(2x + 4)(3x - 3)$	$(2x + 3)(2x - 4)$	$(2x + 3)(3x - 4)$	$(3x + 4)(2x - 3)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

43. Factorise $x^2 - x - 6$

$(x - 3)(x - 2)$	$(x + 1)(x - 6)$	$(x + 3)(x - 2)$	$(x - 3)(x + 2)$	$(x - 1)(x - 5)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

44. Factorise $6x^2 + x - 12$

$(2x - 3)(3x + 4)$	$(2x - 3)(3x - 4)$	$(6x - 3)(x + 4)$	$(2x + 3)(3x - 4)$	$(6x + 3)(x - 4)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

45. Simplify $\dfrac{p^2 - 9}{2p + 6}$

....

(Total 3 marks)

46. Factorise $x^2 - 8x + 15$

$(x–4)(x+2)$	$(x–15)(x+1)$	$(x–3)(x+5)$	$(x+3)(x–5)$	$(x–3)(x–5)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

47. Factorise $12x^2 – 7x – 10$

$(3x–2)(4x–5)$	$(3x–2)(4x+5)$	$(6x+5)(2x–2)$	$(6x–5)(2x+2)$	$(3x+2)(4x–5)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

48. (a) Expand and simplify $2(x + 3) + 3(x + 6)$

....

(2)

(b) Factorise completely $3y^2 – 12y$

....

(2)

(c) Factorise $t^2 - 16$

....

(1)
(Total 5 marks)

49. One of the factors of $3x^2 - 13x - 10$ is $(x - 5)$

What is the other factor?

$(3x + 2)$	$(3x - 2)$	$3(x + 1)$	$(x - 2)$	$(3x - 5)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

50. (a) Expand and simplify $(y + 2)(y + 3)$

....

(2)

(b) Simplify $\dfrac{3(x-2)}{x^2 - 7x + 10}$

....

(2)
(Total 4 marks)

51. Factorise completely $8x^2y + 12x$

A	B	C	D	E
$4x(2xy + 3)$	$20x^3y$	$4x(2xy + 3x)$	$x(4xy + 12)$	$2(4x^2y + 6x)$

(Total 1 mark)

52. Factorise $x^2 + 14x + 24$

A	B	C	D	E
$(x + 8)(x + 3)$	$(x + 6)(x + 4)$	$(x + 14)(x + 24)$	$(x + 12)(x + 2)$	$(x + 12)(x + 12)$

(Total 1 mark)

53. One factor of $4(x + 3)^2 - 5(x + 3)$ is

A	B	C	D	E
$4x + 7$	$4x + 12$	$4x - 12$	$4x - 5$	$5x + 15$

(Total 1 mark)

54. $8x^2 - 29x + 15 =$

A	B	C	D	E
$(4x - 3)(2x - 5)$	$(4x - 5)(2x - 3)$	$(8x - 3)(x - 5)$	$(8x - 5)(x - 3)$	$(8x - 15)(x - 1)$

(Total 1 mark)

55. (a) Factorise $x^2 - y^2$

....

(1)

Hence, or otherwise,

(b) factorise $(x + 1)^2 - (y + 1)^2$

....

(2)
(Total 3 marks)

56. One of the factors of $6x^2 - 9xy$ is

$(2x - 3y)$	$(3x - 3y)$	$(2x + 3y)$	$(2x3y)$	$(2x - 3xy)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

57. Factorise completely $6x^4 + 6x^2$

$x^2(6x^2 + 6)$	$6x^2(x^2 + 6)$	$6x^2(6x^2 + 1)$	$6x^2(x^2 + 1)$	$6x^4(6x^2 + 1)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

58. Which is a factor of $2x^2 - 7x - 4$?

$(2x + 1)$	$(2x - 1)$	$(x + 4)$	$(2x + 4)$	$(x - 4)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

1. (a) (i) 3 — 3

$p = 3$

B1 cao

(ii) 5

$"3"^2 + q = 14$

M1 for $p^2 + q = 14$ *or* $p^2 - 6p + 14 = q$ *or* $(x - p)^2 + 14 - p^2$

A1 cao

(b) (3, 5) — 1

B1 ft from (a) (accept (p, q))

(c) 5 — 1

B1 ft from (a)(ii) (accept q)

(d) (i) (4, 5) — 3

B2 B1 for each correct coordinate ft from (b) (accept (p+1, q))

(ii) (0,21)

B1 for (0, 21) accept 21

[8]

2. (a) $(3x-1)^2$ 2

B1 for (3x – 1)(..x….) cao
B2 for $(3x-1)^2$ cao

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

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

B1 for correct factorisation of numerator
M1 for cancelling of common factors
A1 cao

[5]

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

B2 for x(x – 3)
(B1 for x (…….))

(b) k^3. 1

B1 for k^3.

(c) (i) $7x-1$ 4

$4x + 20 + 3x - 21$

*M1 for **three** of 4 terms 4x + 20 + 3x – 21 (or better)*
A1 for 7x – 1

(ii) $x^2 + 5xy + 6y^2$

$x^2 + 3xy + 2xy + 6y^2$

*M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$*
A1 for $x^2 + 5xy\ 6y^2$

(d) $(p+q)(p+q+5)$ 1

B1 for (p + q)(p + q +5)

[8]

4. (a) k^3. 1

B1 for k^3.

(b) (i) $7x - 1$ 4

$4x + 20 + 3x - 21$

*M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better)*
A1 for $7x - 1$

(ii) $x^2 + 5xy + 6y^2$

$x^2 + 3xy + 2xy + 6y^2$

*M1 for **three** of 4 terms $x^2 + 3xy + 2xy + 6y^2$*
A1 for $x^2 + 5xy + 6y^2$

(c) $(p + q)(p + q + 5)$ 1

B1 for $(p + q)(p + q + 5)$

(d) m^8 1

B1 for m^8.

(e) $6r^3t^6$ 2

B2 for $6r^3t^6$
(B1 for .....r^3t^6 or for 6...t^6)

[9]

5. (a) (i) $(2x - 7)(x - 14)$ 3

M1 x^2 term and constant term (± 98 obtained
or $2x(x - 14) - 7(x - 14)$ or $x(2x - 7) - 14(2x - 7)$
A1 for $(2x - 7)(x - 14)$

(ii) $x = \frac{7}{2}$; $x = 14$

B1ft ft (i) provided of form $(2x \pm a)(x \pm b)$

(b) (i) $\frac{7}{n+7}$ 3

B1 for $\frac{7}{n+7}$ oe

(ii) n=10.5 is not possible since n has to be an integer

$\frac{7}{n+7} = \frac{2}{5} \Rightarrow 2(n + 7) = 5 \times 7$

$2n = 21$

M1 for $2(n + 7) = 5 \times 7$ or $n+7=5 \times 3.5$ (can be implied) ft
(b)(i) fractional in terms of n and < 1
A1 ft for n = 10.5 not possible (since n not integer) oe

(c) $2n^2 - 35n + 98 = 0$ 5

$$2\times\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)=\frac{4}{9}$$

$14n \times 9 = 4(n + 7)^2$

$14n \times 9 = 4(n^2 + 14n + 49)$

$4n^2 + 56n + 196 - 126n = 0$

M1 for $\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ *seen*

M1 for $2 \times \left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ *oe* $=\left(\frac{4}{9}\right)$

M1(dep on 1st M) elimination of fractions within an equation

B1 3 terms correct in expansion of $(n + 7)^2 = n^2 + 7n + 7n + 49$

A1 full valid completion to printed answer

(d) $\frac{1}{9}$ 2

$$\frac{7}{n+7}\times\frac{7}{n+7}=\frac{7}{21}\times\frac{7}{21}=$$

M1 for $\frac{7}{n+7}\times\frac{7}{n+7}$ *or better or ft [answer (b)(i)]*^{2}

or $1-\frac{4}{9}-\left(\frac{n}{n+7}\right)^2$

A1 for $\frac{1}{9}$ *oe cao*

[13]

6. (a) 7 3

$40 - x = 3(4 + x)$
$40 - x = 12 + 3x$
$40 - 12 = x + 3x$
$4x = 28$

M1 multiplying through by 3:
$3 \times \frac{40 - x}{3} = 3 \times 4 + 3 \times x$
A1 $40 - 12 = x + 3x$
A1 cao

(b) $\frac{2x}{2x+3}$ 3

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

B1 for (2x – 3)(2x + 3)
B1 for 2x(2x – 3) or (2x + 0)(2x + 3)
B1 cao

[6]

7. $(x + 1)(x + 6)$ 2

M1 (x + a)(x + b) with ab = 6
A1 cao

[2]

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

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

B1 for (2x – 3)(2x + 3)
B1for (2x – 3)(x – 1)
B1 cao

[3]

9. (a) a^7 1

B1 accept a^{4+3}

	(b)	$15x^3y^4$	2	
		B2 cao *(B1 for two of 15, x^3, y^4 in a product)*		
	(c)	$x - 1$	1	
		B1 cao		
	(d)	$(x + 3)(x - 3)$	1	
		B1 cao		
				[5]
10.	(a)	a^7	1	
		B1 accept a^{4+3}		
	(b)	$15x^3y^4$	2	
		B2 cao *(B1 for two of 15, x^3, y^4 in a product)*		
	(c)	$x - 1$	1	
		B1 cao		
	(d)	$(a + 3b)(a - 3b)$	2	
		B2 for (a + 3b)(a – 3b) *(B1 for (a ± 3b)(a ± 3b)*		
				[6]
11.	(a)	$81x^4y^8$ $3^4x^4y^8$	2	
		B2 for $81x^4y^8$ *(B1 for 2 of 81, x^4, y^8)*		

(b) $\frac{x}{x-5}$ 3

$\frac{x(x-3)}{(x-5)(x-3)}$

B1 for x(x – 3)
B1 for (x – 5)(x – 3)
B1 cao

[5]

12. $\frac{(5+x)(5-x)}{5(5+x)}$

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

B1 for (5 + x)(5 – x)
B1 for 5(5 + x)
B1 cao for $\frac{5-x}{5}$ *oe*

[3]

13. (a) $(x + 2)(x + 4)$ 2

M1 (x ± 2)(x ± 4)
A1 cao

(b) –2, –4 1

B1ft from (a) or –2, –4

[3]

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

B2 cao
B1 (2x – a)(x – b), where ab = 6

(b) (i) $(n - a)(n + a - (n - a))$
or
$n^2 - a^2 - (n^2 - 2an + a^2)$
$2a(n - a)$ 2

M1 for (n – a)(n + a) seen
A1 cao
or M1 for $n^2 - 2an + a^2$ *seen*
A1 cao

(ii) a and $n - a$ are integers
$2 \times n \times (n - a)$ is even — 2

M1 dep for identifying n – a as an integer or multiplying by 2 gives an even number or
M1 dep for identifying an or a^2 as an integer, or for the difference of two even numbers is an even number
A1 correct proof

[6]

15. (a) $x \times 3 - x \times 2x$
$= 3x - 2x^3$ — 2

B2 cao
(B1 for a two term expression with either 3x or $2x^3$)

(b) $4x(3y + x)$ — 2

M1 for taking out a factor of x, 2x, 2, 4 or 4x
A1 cao

(c) $\frac{5a}{b^2}$ — 2

B2 for $\frac{5a}{b^2}$ or $5ab^{-2}$ (accept $\frac{5a}{1b^2}$)
(B1 for either dealing with the numbers or dealing with the powers of a)

(d) $\frac{x-3}{(x+3)(x+3)}$

$\frac{1}{x+3}$ — 2

M1 for (x – 3)(x + 3)
A1 cao

[8]

16. (a) $x^2 - 4x + 3x - 12$
$= x^2 - x - 12$
$x^2 - x - 12$ — 2

M1 for exactly 4 terms correct ignoring signs (x^2, 4x, 3x, 12) or 3 out of 4 terms with correct signs (x^2, –4x, +3x, –12)
A1 cao

(b) $6x^2 - 8x + 15x - 20 = 6x^2 + 7x - 20$
$6x^2 + 7x - 20$ 2

M1 for exactly 4 terms correct ignoring signs ($6x^2$, 8x, 15x, 20) or 3 out of 4 terms with correct signs ($6x^2$, –8x, +15x, –20)
A1 cao

(c) $(x + 2)(x + 5)$ 2

B2 cao
(B1 for exactly one of (x + 2), (x+ 5))

(d) $12p^8q^3$ 2

B2 cao
(B1 for any 2 out of 3 terms correct in a product or 3 terms correct in a sum or part product)

(e) $6 = 15 + 4(q–5)$
$6 = 15 + 4q – 20$
$11 = 4q$
$= 2\frac{3}{4}$ 3

M1 for correct substitution of p and t.
M1 for correct expansion of 4(q – t) oe (eg 4q – 20, 4q – 4t)
A1 11/4 or 2 ¾ or 2.75
or
M1 for correct substitution of p and t.
M1 for $\frac{p - 3t}{4} = q - t$ *oe*
A1 11/4 or 2 ¾ or 2.75

[11]

17. (a) $3a(a – 2)$ 2

B2 for 3a(a – 2)
(B1 for $3(a^2 – 2a)$ or a(3a – 6) or 3a(linear expression in terms of a))

(b) ½ (P – 10) 2

M1 for correctly isolating 2q or –2q correctly dividing both sides by 2 or for a correct second step which may follow an incorrect first step
A1 for ½ (P – 10) oe

(c) $y^2 + 3y - 4y - 12 = y^2 - y - 12$ 2

B2 for $y^2 - y - 12$

(B1 for 3 out of 4 terms in $y^2 + 3y - 4y - 12$)

(d) $(2p + 3q)(2p - 3q)$ 2

M1 for $(2p \pm 3q)(2p \pm 3q)$ or $(2p)^2 - (3q)^2$

A1 for $(2p + 3q)(2p - 3q)$

[8]

18. (a) $3x(2x + 3y)$ 2

B2 for fully correct (accept $(3x - 0)(2x + 3y)$

(B1 for $x(6x + 9y)$ or $3(2x^2 + 3xy)$ or $3x$(a linear expression in x and y)

(b) $2x^2 - 4x + 5x - 10$

$2x^2 + x - 10$ 2

B2 for $2x^2 + x - 10$

(B1 for 3 out of 4 terms correct, with correct signs, or the 4 terms $2x^2$, $4x$, $5x$ and 10 seen, ignoring signs)

[4]

19. (a) $x^2 - 2x - 24$ 2

$x^2 - 6x + 4x - 24$

M1 for any 3 terms correct

A1 cao

(b) $6x\,(2x - 3y)$ 2

B2 for $6x(2x - 3y)$

*(B1 for either $x(12x - 18y)$ **OR***

*$2x(6x - 9y)$ **OR** $3x(4x - 6y)$*

***OR** $6x(ax - by)$ where either $a \neq 2$ or $b \neq 3$*

[4]

20. $\frac{x}{(2x+3)}$ 3

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

B3 for $\frac{x}{(2x+3)}$
[B1 for x(2x + 3) seen
***AND** B1 for (2x – 3)(2x + 3) seen]*

[3]

21. (i) $(x-3)(x-4)$
B1 cao

(ii) $x = 3, x = 4$ 3

$(x-3)(x-4) = 0$
M1 for "(i)" = 0 provided "(i)" is of the form
(x + a)(x + b) where a and b are integers
(SC: If M0, B1 for x = 3 or x = 4)

[3]

22. (a) $x(x + 1)$ 1
B1 [accept (x + 0)(x + 1)]

(b) $(y + 5)(y - 7)$ 2
B2 for (y + 5)(y – 7)
[B1 for (y ± 5)(y ± 7)]

[3]

23. $(x + 5)(x - 3)$ 2
B2 cao
(B1if sign(s) incorrect)

[2]

24. $(x–7)\ (x + 2)$ 2
M1 for (x ± 7) (x ± 2)
A1 cao

[2]

25. $\frac{x^2}{x-5}$ 2

$\frac{x^2(5+x)}{(x+5)(x-5)}$

M1 for $\frac{x^2(5+x)}{(x+5)(x-5)}$

A1 cao

[2]

26. (a) $12x^2 + 11x + 2$ 2

$12x^2 + 8x + 3x + 2$

M1 for expansion (condone one error)
A1 cao

(b) $3x(x + 2y)$ 2

B2 cao
(B1 for 3x(   ) or __(x + 2y) or 3(x² + 2xy) or x(3x + 6y))

[4]

27. (a) $(x - 5)(2x - 7)$ 2

$(x - 5)(2x - 10 + 3)$

M1 for (x – 5) (2(x – 5) + 3) or for identifying (x – 5) as a common factor or 2x² – 17x + 35
A1 cao

(b) $\frac{3}{y-4}$ 1

B1 cao

[3]

28. $(y + 5)(y - 2)$ 2

B2 for (y + 5)(y – 2)
(B1 for (y ±5)(y ± 2))

[2]

29. $(x + 2)(x + 4)$ 2

M1 $(x \pm 2)(x \pm 4)$
A1 cao

[2]

30. $4x(2x - 3y)$ 2

B2 for $4x(2x - 3y)$
*(B1 for $4(2x^2 - 3xy)$ **or** $x(8x - 12y)$ **or** $2x(4x - 6y)$ **or** $4x(2x - 3)$ **or** $4x(2 - 3y)$)*

[2]

31. $3x + 6 = 3(x + 2)$ 3

$x^2 - 4 = (x + 2)(x - 2)$

$\dfrac{3}{(x-2)}$

M1 for $3(x + 2)$
M1 for $(x + 2)(x - 2)$
A1 cao

[3]

32. (a) $12ef$ 1

B1 cao

(b) $5(x + 3)$ 1

B1 cao

(c) $8r + 9$ 2

*M1 for $2r + 6 + 6r + 3$ **or** $8r$ **or** 9*
A1 cao

[4]

33. (a) $2(4p - 3)$ 1

B1 cao

(b) $y^2(y - 1)$ 2

B2 for $y^2(y - 1)$ or $(y^2 + 0)(y - 1)$

(B1 for $y(y^2 - y)$ or $(y + 0)(y^2 - y)$)

SC: Award B1 for $y^2(y - 0)$ or $y^2(y + 1)$

(c) $e^2 + 7e + 12$ 2

M1 for 3 out of the 4 terms e^2, 4e, 3e, 12 correct or $e^2 + 7e + k$

A1 cao

[5]

34. $\frac{(x+2)(x+3)}{x+2}$ 3

$= x + 3$

M1 for attempting to factorise the quadratic by seeing $(x \pm 2)(x \pm 3)$ or $(x \pm 6)(x \pm 1)$

A1 for $(x + 2)(x + 3)$

A1 cao (accept $\frac{x+3}{1}$)

[3]

35. $n^2 + 4n + 4 - (n^2 - 4n + 4)$ 2

$= n^2 + 4n + 4 - n^2 + 4n - 4$

$= 8n$

M1 for either $n^2 + 2n + 2n + 4$ or $n^2 - 2n - 2n + 4$ oe

A1 for showing that terms reduce to 8n

[2]

36. (a) $15p - 6$ 1

B1 for $15p - 6$

(b) $6x + 3 + 6x - 2$

$= 12x + 1$ 2

B2 for $12x + 1$

(B1 for 12x or + 1 or $6x + 3$ or $6x - 2$)

(c) $(a-8)(a-8)$ — 2

B2 for (a – 8)(a – 8) or $(a-8)^2$
(B1 for a in both brackets and two numbers multiplying to 64 or –64)
Condone the missing trailing bracket.

37. (a) $3x+6$ — 1

B1 for 3x + 6 oe

(b) $5(t+4)$ — 1

B1 for 5(t + 4) oe

[2]

38. $(x-3)(x+5)$ — 2

M1 for (x ± 3)(x ± 5), ignoring signs
A1 cao
Sight of the correct answer (x + 5)(x – 3) followed by any further algebraic manipulation, eg solving a quadratic, loses the final mark. Take care though, they may be just checking their factorisation.
We can condone the odd omission of a bracket. For example, (x + 5)(x – 3 or x + 5)(x – 3) would gain full credit.

[2]

39. $\frac{4(a-5)}{(a+5)(a-5)}$ — 3

$= \frac{4}{a+5}$

M1 for 4(a – 5)
M1 for (a + 5)(a – 5)
A1 cao

[3]

40. E

[1]

41. D

[1]

42. D

[1]

43. D

[1]

44. D

[1]

45. $\frac{p^2 - 9}{2p + 6} = \frac{(p-3)(p+3)}{2(p+3)}$

$= \frac{p-3}{2}$ oe 3

B1 for (p – 3)(p + 3)
B1 for 2(p + 3)
B1 for $\frac{p-3}{2}$ *oe for example* $\frac{p}{2} - 1\frac{1}{2}$

[3]

46. E

[1]

47. E

[1]

48. (a) $2x + 6 + 3x + 18$
$5x + 24$ 2
M1 for 2 × x + 2 × 3 or for 3 × x + 3 × 6
A1 for 5x + 24 cao

(b) $3y(y - 4)$ 2
M1 for $3y(ay - b)$ or for $3(ay^2 - by)$ or for $y(3y - 12)$
A1 for $3y(y - 4)$ cao

(c) $(t - 4)(t + 4)$ 1
B1 for $(t - 4)(t + 4)$ oe

[5]

49. A

[1]

50. (a) $y^2 + 3y + 2y + 6$
$y^2 + 5y + 6$ 2
M1 for 3 terms out of y^2, $3y$, $2y$, 6
or $y^2 + 5y$ (+ c) or $(dy^2 +)5y + 6$
A1 for $y^2 + 5y + 6$

(b) $\dfrac{3(x-2)}{(x-2)(x-5)}$

$\dfrac{3}{x-5}$ 2
M1 for $(x \pm 2)(x \pm 5)$
A1 cao

[4]

51. A

[1]

52. D

[1]

53. A

[1]

54. D

[1]

55. (a) $(x + y)(x - y)$ 1

B1 cao

(b) $((x + 1) - (y + 1)) \times ((x + 1) + (y + 1))$

$x^2 + 2x + 1 - (y^2 + 2y + 1)$

$= x^2 - y^2 + 2x - 2y$

$= (x - y)(x + y) + 2(x - y)$

$(x - y)(x + y + 2)$ 2

M1 for attempt to replace x by (x + 1) and y by (y + 1)

A1 cao

Alternative

M1 for expanding both brackets to get

$x^2 + 2x + 1$ and $y^2 + 2y + 1$

A1 cao

[3]

56. A

[1]

57. D

[1]

58. A

[1]

1. As expected this question was not answered well by the low grade A and weaker candidates. In part (a) a common wrong answer was $p = 6$ and $q = 14$. Some better candidates found the correct value for q but quoted p as –3. Top grade candidates generally appreciated the link between part (a) and the later parts with many such candidates giving the correct coordinates for M and the correct value for k. Those who recognised the horizontal translation required in part (d) were usually successful in (i) but only the very best candidates considered the value of f(–1) to show that the curve crossed the y-axis at 21.

2. Part (a) was a routine factorisation, but proved to be too hard for many candidates.
Those who could do part (a) generally went on in part (b) to complete the correct cancellation of the algebraic fraction following the factorisation of the numerator.

3. Only about one quarter of the candidates factorised $x^2 - 3x$ correctly in part (a). Many candidates did not seem to know what was required and few of those not gaining both marks recognised that x was a common factor. Candidates were more successful in part (b) but there were a surprising number who did not know what to do and both $k3$ and $k^{2.5}$ were common incorrect answers. In part (c) many candidates correctly expanded the brackets in (i) to produce three or four correct terms but the resulting expression was often simplified incorrectly. A common mistake was for +20 –21 to become +41. Fewer correct answers were seen in (ii) and a common incorrect answer to this part was $2x+5y$. Many of the candidates who knew what to do obtained three correct terms and gave the fourth term as $6y$ or $5y^2$. When three or four terms were obtained there was a good success rate with collecting like terms. Correct answers to part (d) were extremely rare. Some of those who appeared to know how to factorise the expression failed to use brackets correctly and wrote $p + q(p + q +5)$.

4. **Mathematics A Paper 7**

In this algebraic expressions question the vast majority of candidates obtained the correct answer to part (a), the method marks in part (b) and, less so, a mark in part (e). The common errors were writing "$6y$" instead of "$6y^2$" in the expansion in part (b)(ii), expanding everything in (c) and then 'moving on', writing m^{-6} as the wrong answer to part (d) and failing to simplify "2 × 3" as "6" in the final part.
In part (c), which was answered badly, some of the better attempts failed to gain the mark because the brackets were missing around the common factor with answers being left as "$p+q(p+q+5)$"

Mathematics B Paper 18

Part (a) was answered correctly by the vast majority of candidates. Part (bi) was mostly answered correctly. In (bii) $3y \times 2y$ was frequently evaluated as $6y$ rather than $6y^2$. Parts (c) and (d) were poorly done; only a very few correct answers were seen. In part (e), the common error was to leave the answer as $2t^6 \times 3r^3$. Some candidates erroneously introduced an addition sign into the expression.

5. Mathematics A Paper 5

Although full correct solutions for this question were seen by the best candidates it was a rarity. Except for answers to (b)(i) it was unusual to find candidates at grade C and low B gain any further credit although some high grade B candidates scored 4 or 5 marks normally in parts (a) and (b). In part (a) those who applied a systematic approach were generally far more successful as illustrated by "2 × 98; 4 × 49; 28 × 7**" In part (b)(i) many of the given expressions were correct although $\frac{n}{n+7}$ was a common wrong answer. In part (b)(ii), although many could not present an adequate proof/explanation with a common wrong approach based on the 'fact' that "Bill is saying that there is only a total of 5 balls and we have 7 white balls", it was pleasing to find even some grade B candidates presenting a full logical proof based on n=10.5 and unable to have half a ball. Part (c) was very poorly answered with most just attempting to solve the equation (again). Of the reasonable attempts most gained credit for one product of two probabilities and a correct expansion of $(x \quad 7)^2$ but many failed to eliminate the algebraic fractions correctly or missed out the second combination of probabilities. It was pleasing to find candidates recovering in the last part to gain a method mark for a relevant squaring of their answer to part (b)(i).

Mathematics B Paper 18

In part (a), the majority of candidates were unable to factorise the given expression. Of those who did obtain the correct factorisation a number then went onto solve the associated equation incorrectly with 7 (instead of $\frac{7}{2}$) being a popular incorrect solution. The majority of candidates were able to give the correct probability in part (bi) but then in (bii) were unable to offer a convincing proof that Bill's statement could not be correct. Part (c) was very poorly done with the majority of candidates starting with the equation given rather than using the information given to derive it. In part (d) very few candidates referred back to the expression for the probability quoted in (bi).

6. Mathematics A

Part (a) is notionally grade B and many candidates were able to make a beginning. However, there were many poor attempts with common errors being $120 – 3x = 12 + 3x$ and $40 – x = 12 + 3x$, so, $28 = 2x$.
Part (b) was poorly answered with most candidates not spotting the factorisation of the denominator. Many cancelled the $4x^2$ only.

Mathematics B

Paper 17

This was very poorly answered with candidates, again, preferring to employ trial and improvement methods (which nearly always failed). Algebraic techniques were often abandoned after numerous errors would lead to unlikely solutions.
Of those candidates who understood the algebraic methods many often multiplied the equations by appropriate scale factors and then either added or subtracted their equations inaccurately.

Paper 19

Fully correct solutions were seen by about half the candidates. The majority of candidates were aware of the basic method to use to solve this question but failed to carry it out successfully. The most common error was to carry out the wrong operation at the substitution stage. Of those candidates who chose the correct operation at this stage, poor arithmetic prevented them from obtaining the correct solution.

7. **Paper 4**

The recent deterioration in algebraic manipulative skills was clear in the poor solutions to this question. Few candidates gained any marks, as there was little understanding of what was meant by "factorise". As a result many candidates failed to attempt the question.

Paper 6

This was a standard factorisation of a binomial expression and most candidates found little difficulty with it.

8. Good candidates recognised that they had to factorise the numerator and factorise the denominator and then to cancel any common factors. Many candidates did not see this and cancelled individual terms. Many others could not factorise at least one of the numerator and denominator.

9. **Specification A**

It was pleasing that many candidates answered part (a) correctly. Common incorrect answers were a^{12} and $2a^7$. In part (b) the answer given was usually a product but the powers of x and y were frequently incorrect. Candidates also found part (c) difficult. Part (d) was answered least well. Many candidates realised that factorising involves inserting brackets but few were able to do this correctly. $x(x - 9)$ was a common incorrect response.

Specification B

Part (a) was answered well although answers of a^{12}, $7a$ and 12a were not uncommon. Many candidates in part (b) scored at least one mark for correct part answers, finding two out of 15, x^3 and y^4. The most common wrong answers were $8x^3y^4$ and $15 + x^3 + y^4$. Part (c) was poorly answered with only thee more able candidate making any serious attempt. $x – 1^2$ was a common response. Few candidates were able to factorise correctly in part (d), the best of the incorrect answers including $(x – 9)(x + 9)$ and $(x – 3)^2$.

10. This was a set of standard algebraic simplifications. Part (a) caused no problems but weaker candidates on part (b) made errors such as adding the 3 and the 5 to get $8x^3y4$, or treating the power of the x as zero rather than 1. On part (c) many candidates expanded the numerator and then candled the x terms.
Part (d), difference of two squares was recognised as such by many. Other attempts, however, rarely resulted in a correct answer with such as $(a – 9b)^2$, $a(a – 9b)$ and $(a – 3b)^2$often seen.

11. It was a standard evaluation. Several candidates sensibly wrote out $3xy^2$ four times and then multiplied the terms together. Common errors included a coefficient of 12 or a term in x of just x alone. Some candidates did not evaluate 3^4.
On part (b) those candidates who factorised the numerator and denominator were usually given all three marks. Many candidates scored zero marks, usually by cancelling the squared terms and the x terms to give for example $\frac{1}{5x+15}$.

12. Although many weak candidates were unable to make much progress with this question, most strong candidates gained at least one mark, usually for factorising $25 + 5x$. A common error in factorising $25 – x^2$ was$(x – 5)(x + 5)$. A common error amongst weaker candidates was

$$\frac{25-x^2}{25+5x}=\frac{-x^2}{5x}$$

13. **Specification A**

Intermediate Tier

Few marks were earned in this question. Of those who did manage to factorise in part (a), frequently they did not know how to apply this in part (b). The most common response to part (a) was $x(x + 6)$ with –6 and –-8 following in part (b), none of which earned any marks.

Higher Tier

This question was generally done well. Many candidates were able to factorise the expression in part (a) and use this to answer part (b). A common mistake in part (a) was the incomplete factorisation $2x(x + 3) + 8$. A common mistake in part (b) was to incorrectly interpret the factorised expression in part (a) to derive an answer with incorrect signs. A significant number of candidates obtained their answer to part (b) by the quadratic formula even though they had a completely factorised expression in part (a).

Specification B

Intermediate Tier

Factorisation of the given quadratic expression was poor, $x(x + 6)+ 8$ being the best of the failed efforts. Those candidates who understood the method usually got the correct answer. In part (b) answers of $x = 2$ and $x = 4$ often followed a correct part (a). A few candidates, having failed in part (a), started again in part (b) and successfully found the correct solutions. This gained one mark only, unless there had been no attempt at all in part (a).

14. About half the candidates were able to gain at least one mark for part (a).
A common mistake here was $(2x–1)(x–6)$.
Only the best candidates were able to make any progress with part (b). Some could expand $(n–a)^2$ correctly, but a significant number gave the answer as $n^2–2na–a^2$ or $n^2–2na–a$or $n^2 –2na–2a$. In context, few candidates could expand $–(n–a)^2$. The alternative approach of factorising $n2 –a^2$ was seen rarely. Only the very best could give a complete explanation of why the expression was an even integer, but many commented that a number multiplied by 2 must be even.

15. Part (a) was done well. Most candidates were able to obtain the $3x$ term, but errors in obtaining the $2x^3$ term were frequent- typically this term was written as $3x$, $3x^2$, $2x^2$ or $6x^2$. Some candidates knew the method for expanding brackets but were unable to complete the algebra, thus leaving their final answer as $x \times 3 - x \times 2x^2$

A small number of candidates expanded the brackets correctly but then went on to 'simplify' their expression further. Common incorrect final answers here were x^2, $-x^2$, x^3, $-x^3$, $1x^{-2}$

Most candidates were able to score at least 1 mark in part (b). The requirement to use brackets was understood and if not fully factorised many were able to extract at least one common factor, usually $4(3xy + x^2)$ or $x(12y + 4x)$.

Those candidates that chose to show their working in part (c) were often able to gain a mark for either simplifying the numbers or simplifying the terms in a, but many candidates went straight to the answer, typically writing $5ab^2$. Another popular error was to cancel the square from the a with the square from the b, i.e. going from $5a^2/ab^2$ to $5a/ab$. A significant number of candidates showed separately that $20/5 = 4$ and $a^2/a = a$ but then wrote their final answer as $5ab^2$

In part (d), only the best candidates were able to score full marks on this question. A surprising number of candidates, having correctly factorised the denominator and correctly cancelled the common factor from both, the numerator and the denominator, and then went on to give their final answer as $x + 3$. By far the most common method was to cancel like terms from both the numerator and the denominator to achieve variations of $\frac{\cancel{x} - \cancel{3}}{x^2 - \cancel{9}^3} = \frac{1}{x - 3}$

16. Parts (a) to (d) were straightforward tests of algebraic manipulation. Generally, these were carried out well, with few errors. There were some difficulties with part (d) with answers such as $pq(3p^4 \times 5p^2q)$, $7p^8q^3$ and $12p^8 + q^3$.

Part (e) proved more of a challenge for weaker candidates. There are essentially two approaches; the first approach involves rearranging the algebra to $q = \frac{p - 3t + 4t}{4}$ and then substituting for p and t. This gives the value of q directly. The second approach is to substitute for p and t first and then to solve the resulting equation. The second approach proved to be more popular and was generally successful. However, many candidates made a BIDMAS error of $6 = 15 + 4(q - 5) \Rightarrow 6 = 19(q - 5)$.

17. Part (a) was answered well by about half the candidates, and many were able to achieve a mark for partially factorising either the 3 or the a. Common errors were $3a(a - 3)$ and $3a(a + 2)$

Part (b) was done well by many candidates. Candidates should be encouraged to show all stages in an algebraic manipulation. A significant number of candidates simply wrote down their final answer (often incorrectly) without showing any working. Many candidates were confused about the order of operations and/or the nature of the operations. Typical first line errors were $\frac{P}{2} = q + 10$ $2q = P + 10$ and $q = 2P + 10$.

Part (c) was done well by the majority of candidates. Most candidates were able to expand the brackets with obtain at least three of four correct terms. Common errors were $-4y + 3y = -7y$, $y \times y = 2y$ and $(y + 3)(y - 4) = y^2 + 3y - 4y - 1$

In part (d), only the best candidates were able to achieve both marks for factorising the expression. Common errors amongst those candidates who showed some understanding of what was required were $(2p - 3q)(2p - 3q)$and $(2p)^2 - (3q)^2$.

18. Many candidates failed to factorise the given expression fully and answers of $3(2x^2 + 3xy)$, and $x(6x + 9y)$ were common. Some candidates, understanding something of the concept of factorisation, took 6 or 6x as a common factor giving answers of $6x(x + 1.5y)$ or $6x(x + 9y)$ These gained no marks.

In part (b), sign errors often resulted in candidates losing one of the two marks. The most common incorrect answers were $2x^2 + 9x \pm 10$ and $2x^2 + x \pm 7$ (or ± 3), usually after one mark had been awarded. A significant number of candidates had no idea how to expand the brackets giving answers of for example, $2x^2 \pm 10$

19. This question was not well answered. A number of candidates scored 1 mark in part (a) for 3 correct terms only, usually giving the numerical term as –2 or + 24. Mistakes at the simplification stage were commonplace where candidates combined terms that should have been separate. The requirements of factorisation is not understood by many candidates as part (b) was seldom done correctly. This part was very centre dependant and even then partial factorisation, earning 1 mark, was seen more than the complete answer.

20. This was a demanding question, which enabled the most able candidates to display good algebraic techniques. Some candidates were able to factorise the numerator but not the denominator. The majority of candidates tried various forms of cancelling (typically starting with the squared terms) without factorising.

21. Only very few candidates understood the concept of factorisation, and of those only a small number managed to factorise the polynomial accurately. In part (ii) algebraic methods usually ignored part (i), even if correct, and attempted to solve the quadratic by separating $x^2 - 7x$ from the 12, leading to failure. It was more common to award marks in this part of the question for a single correct solution found by trial and improvement; rarely were both solutions found correctly by this method.

22. Only a minority of the more able candidates demonstrated good knowledge of factorisation. Many interpreted it as some sort of "simplification", leading to answers of $2x^2$ or x^3 in part (a) and $2y^2 - 35$ or $4y - 35$ in part (b). Of those showing some understanding of factorisation wrong answers of $x(x + x)$, $x(x + 0)$ and $x(x \times x)$ in part and $(y - 35)(y - 1)$ and $y(y - 2) - 35$ in part (b) were commonplace. Very few candidates gained full marks on this question.

23. Very poorly done by all but the most able of candidates; many making no attempt at all. Of the 18% who gained any marks only a small proportion failed to quote the correct signs. Misunderstanding of this type of factorisation problem often led to answers of $3x^2 - 15$, $2x^2 - 15$, $x^2 - 15$, $4x - 15$ and $- 11x$. $x(x + 2) - 15$ was also frequently seen, showing some understanding of factorisation.

24. Mixing the signs up was quite common although in general, candidates answered this question well.

25. Candidates who were able to factorise the denominator usually went on to gain full marks although there were a significant number of such candidates who lost the accuracy mark as they then incorrectly simplified $\frac{x^2}{x-5}$ as $\frac{x}{-5}$.

26. Factorisation (part (b)) was much better understood than the expanding of brackets. In part (a) common errors were $4x \times 3x = 12x$ (leading to an answer of $23x + 2$) and $2 \times 1 = 3$. Many candidates merely added all the terms to get $7x + 3$. In part (b) incomplete factorisation was not uncommon and some candidates believed that they had to simplify the expression and gave $9x^3y$ as their answer.

27. Only a very small minority of candidates were able to gain any credit for part (a). The majority of candidates attempted to expand the brackets and then made errors. Of those candidates who used this method a number were able to simplify the expression to the correct quadratic expression and a very few candidates were then able to factorise this correctly. Very few candidates spotted the common factor in part (a). Candidates were more successful in part (b).

28. Candidates extracted the common factor of the first two terms giving $y(y + 3) - 10$. An answer of $(y + 3)(y - 10)$ was not uncommon from candidates attempting to factorise using the product of two bracketed terms.

29. Candidates that knew how to factorise a quadratic equation, and this represented the vast majority, were able to gain full marks. Of those candidates that could not recall the correct method, the most common error seen was to partially factorise the expression and give $x(x + 6) + 8$ as the answer. This error appeared to be more common than is usual.

30. This was a well answered and well understood question with 45% of candidates scoring full marks. About 10% of candidates gave partial factorisations of various sorts but this still left 45% of candidates scoring no marks.

31. Only 16% of candidates were able to get a fully correct solution to this question and quite well done by those who attempted a factorisation. More got the numerator correct than did the denominator, the latter often recognised as the difference between 2 squares but with 4's instead of 2's. However a popular way was to cancel terms on the top with those on the bottom without factorising at all. So 6 – 4 became 2 giving $3x + 2$ which had to be watched out for! The x's were often cancelled and of the other combinations…$9x$ / 4was quite popular.

32. This question was very well understood with 80% achieving success with part (a) 65% with the factorising in part (b) and 60% getting part (c) fully correct with a further 20% gaining partial success for $8r$ or 9

33. Factorising '$8p – 6$' in part (a) provided a reasonable introduction to this algebra question with just over half the candidates writing correct responses. Less confident attempts might have been helped by breaking down the expression into component parts like '$(4)(2)p – (3)(2)$' which allows the '2' to be seen as the common factor.

Part (b) was rather more troublesome with many gaining just part marks for writing '$y(y^2 – y)$' instead of the full factorisation leading to '$y^2(y – 1)$'. It was not unusual to find that further simplification was attempted turning a correct final answer into one that was incorrect. It is important that candidates know when to stop in algebra questions as subsequent working is taken into account when assessing the award of marks. The mean mark of 0.52 for this question may well have been higher as a result.

Part (c) required the expansion of two brackets by multiplication. It was encouraging to find that a method was being applied to successfully achieve the multiplication of the brackets. Less impressive was the number of numerical errors being made with '$4 \times 3 = 7$' high on the list. It was disappointing to find once more that, having arrived at the correct expression of '$e^2 = 7e + 12$', there was the desire to combine terms together and thus forfeit the answer mark. The mean mark for this part of the question was 1.17.

34. The simplifying of the algebraic expression was quite testing for many. The usual trick of attempting to cancel out individual terms from the numerator and denominator was much in evidence. For example the '6' was cancelled down by the '2' leaving a bare figure of '3' and a similar process was applied to the '*x*' terms. There was, however, a significant number who realised that the numerator had to be factorised first. The factorisation though was not handled confidently with abandoned brackets littering the working space.

For the few who managed to achieve the expression $\frac{(x+2)(x+3)}{x+2}$ they did not always continue to simplify further and thus lost the mark for the final answer.

35. A variety of methods were used in this question, some of which were more convincing than others. Many tried to prove the result using a numerical method which was really no more than substituting values into the left hand side to show that it did indeed produce the right hand side. Since it worked for one or two or three values they erroneously concluded that it must work for all values. This being very clearly an algebra question any numerical approach was not rewarded. For those who approached it algebraically, errors in expanding the brackets '$(n + 2)^2$' and '$(n – 2)^2$' did not help. A further difficulty arose in dealing with the negative sign between the two brackets as those who disregarded it managed to simplify the left hand side to '8' rather than '$8n$'. In spite of this there were some very elegant solutions, from a minority, who set out their solution in a developing way to show the stages in achieving a proof. Most clearly struggled with this type of question with the mean mark being only 0.13 even though a mark could have been scored merely by expanding one of the brackets correctly.

36. ¾ of the candidates were able to expand $3(5p − 2)$ correctly in part (a). In part (b) most candidates scored at least one of the two available marks by either expanding one of the brackets correctly, (generally the first), or correctly adding each of the $6x$ terms from their attempt at the expansion of the two brackets. The mean mark for this part of the question was 1.17.

The mean mark of 0.57 in (c) indicates that not many of the candidates were able to factorise $a^2 − 16a + 64$ correctly. Many candidates did, however, manage to score 1 of the 2 available marks by getting the correct expressions in each of the brackets but getting one or both of the signs incorrect. A few scored 1 mark for *a* in both brackets with two numbers whose product was 64 or −64.

37. Both parts of this question were usually well done but the answers of , $3x + 2$, $9x$ and $5x$ were not uncommon in part (a) while $25t$ and $5(t + 20)$ were common errors in part (b).

38. $x(x + 2) – 15$ and $(x + 3)(x – 5)$ were the most common incorrect answers of those candidates who showed some understanding of factorisation. Very many candidates had no idea at all.

39. Very few candidates attempted to factorise both the numerator and the denominator Some, who did, then spoiled it by incorrect cancelling, but more often this did usually gave a fully correct solution.

More often, candidates made attempts at simply cancelling the given expressions, for example; $\frac{4a-20^4}{a^2-25^5}$ to give $\frac{4}{a-5}$ or similar, gaining no marks.

40. No Report available for this question.

41. No Report available for this question.

42. No Report available for this question.

43. No Report available for this question.

44. No Report available for this question.

45. This question was poorly done with very few candidates realising the need to factorise the algebraic numerator and denominator. Many attempts to simplify by random cancelling were seen, a few actually resulting in the "correct" answer. In such cases no marks were awarded when it was clear that an incorrect method had lead to the required answer. Some candidates recognised the need to factorise but only factorised one of the expressions, usually correctly and so gained partial credit.

46. No Report available for this question.

47. No Report available for this question.

48. This question was poorly answered overall. Part (a) was the most successful with almost all candidates gaining at least one mark for multiplying out one of the brackets. About a third of the candidates gained a mark in (b) for a partial factorisation of the expression but fully correct solutions were rare. In part (c) only about 10% of candidates gave the correct answer for the factorisation of the difference of two squares.

49. No Report available for this question.

50. A variety of methods were used by candidates when answering the first part of the question. Almost 80% of answers seen gained at least one mark for writing down 3 or more correct terms in the expansion. A common error from those who did not score full marks for this part of the question was to add rather than multiply the constant terms. In part (b) partial credit was given to candidates who made a good attempt at factorising the denominator of the fraction. Some candidates multiplied out the numerator and tried to factorise the denominator (sometimes successfully) and hence failed to simplify the fraction. Clearly, for some candidates this material was unfamiliar territory. About one quarter of candidates completed this part successfully.

51. No Report available for this question.

52. No Report available for this question.

53. No Report available for this question.

54. No Report available for this question.

55. This question was poorly answered with 62% of candidates gaining no marks at all. Only 0.4% of candidates gained all three marks for a fully correct solution with 25% gaining one mark either for multiplying out both $(x + 1)^2$ and $(y + 1)^2$ correctly or for correctly factorising $x^2 - y^2$.

The remaining 13% of candidates gained two marks, usually for obtaining the correct answer to (a) and squaring the two brackets in (b). Very few candidates linked the two parts of the question and the hint in the question of "Hence" was ignored by all but the most able candidates. Here again presentation of clear logical steps was often sadly lacking with candidates work arranged often in random order.

56. No Report available for this question.

57. No Report available for this question.

58. No Report available for this question.