

**AQA Computer Science A-Level**  
**4.5.4 Binary number system**  
Past Paper Mark Schemes

## Additional Specimen AS Paper 2

<b>02</b>	<b>4</b>	<p><b>All marks AO2 (apply)</b></p> <p>00001001 00000011 x</p> <p>00001001 00010010     1 mark (rows in any order);</p> <p>00011011     1 mark for final answer;</p>	<b>2</b>
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<b>02</b>	<b>5</b>	<p><b>All marks AO2 (apply)</b></p> <p>011111; 31;</p>	<b>MAX 1</b>
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## Additional Specimen Paper 2

<b>02</b>	<b>1</b>	<p><b>All marks AO2 (apply)</b></p> <p>Correct representation of 78: 01001110; Correct representation of -23: 11101001; Correct result 55: 00110111;</p>	<b>3</b>
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<b>02</b>	<b>2</b>	<p><b>All marks AO2 (apply)</b></p> $  \begin{array}{r}  1\ 0\ 1\ 1 \\  * \quad \underline{1\ 0\ 1} \\  1\ 0\ 1\ 1 \\  \qquad \qquad 0 \\  \underline{1\ 0\ 1\ 1\ 0\ 0} \\  1\ 1\ 0\ 1\ 1\ 1  \end{array}  $ <p style="margin-left: 150px;">} <b>1 mark (A if 0 row not present A rows in any order)</b></p> <p style="margin-left: 150px;">} <b>1 mark</b></p>	<b>2</b>
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03	1	Mark is for AO2 (apply) 177;	1
03	2	Mark is for AO2 (apply) -79;	1
03	3	Mark is for AO2 (apply) 22 1/8 // 22.125;	1

### June 2011 Comp 3

3	(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>0</td><td>●</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> </table> <p style="text-align: center;">Mantissa</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>1</td><td>0</td><td>0</td><td>0</td> </tr> </table> <p style="text-align: center;">Exponent</p> <p>1 mark for correct mantissa 1 mark for correct exponent</p>	0	●	1	0	0	0	0	0	0	1	0	0	0	2
0	●	1	0	0	0	0	0	0								
1	0	0	0													
3	(b)	<p>1 method mark for either:</p> <ul style="list-style-type: none"> <li>• showing correct value of both mantissa and exponent in denary</li> <li>• showing binary point shifted 2 places to right in binary number</li> <li>• indicating that final answer calculated using answer = mantissa <math>\times 2^{\text{exponent}}</math></li> </ul> <p>1 mark for correct answer [ Mantissa = -0.625 // -5/8 Exponent = 2 Answer = -2.5 // -2½</p>	2													
3	(c)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>0</td><td>●</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td> </tr> </table> <p style="text-align: center;">Mantissa</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>0</td><td>1</td><td>0</td><td>0</td> </tr> </table> <p style="text-align: center;">Exponent</p> <p>1 mark for correct mantissa 1 mark for correct exponent</p>	0	●	1	1	0	0	1	1	0	0	1	0	0	2
0	●	1	1	0	0	1	1	0								
0	1	0	0													
3	(e)	<p>Reduced precision; Increased range; <b>A</b> can represent larger/smaller numbers No effect on amount of memory required to represent a number;</p>	Max 2													



6	(c)	<p><b>1 mark</b> for working:</p> <p>Showing a bit pattern including 1101 and any number of preceding or following 0s, but no other 1s;          Showing the correct value of the exponent in denary (9);          Showing the binary point being shifted 9 places;  <b>MAX 1</b></p> <p><b>1 mark</b> for correct mantissa and exponent together:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">●</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="width: 20px;"></td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> </tr> <tr> <td colspan="8" style="text-align: center;">Mantissa</td> <td colspan="5" style="text-align: center;">Exponent</td> </tr> </table> <p><i>If answer is correct and some working has been shown, award two marks, even if working would not have gained credit on its own.          Marks for working can be awarded in the answer.</i></p>	0	●	1	1	0	1	0	0		0	1	0	0	1	Mantissa								Exponent					2
0	●	1	1	0	1	0	0		0	1	0	0	1																	
Mantissa								Exponent																						

6	(d)	<p><b>2 marks</b> for working:</p> <p>Correct representation of 12.5 in fixed point binary: 1100.1;          Bits flipped: 0011.0 // 10011.0; <b>A</b> any number of preceding 1s          Correct representation of -12.5 in fixed point twos complement:          10011.1; <b>A</b> any number of preceding 1s          Showing the correct value of the exponent in denary (4) or binary // showing the binary point being shifted four places;          Showing the correct value of the mantissa in floating point binary (1.001110)</p> <p><b>MAX 2</b></p> <p><b>1 mark</b> for correct mantissa and exponent together:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">●</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="width: 20px;"></td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">1</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">0</td> </tr> <tr> <td colspan="8" style="text-align: center;">Mantissa</td> <td colspan="5" style="text-align: center;">Exponent</td> </tr> </table> <p><i>If answer is correct and some working has been shown, award three marks, even if working would not have gained credit on its own.          Marks for working can be awarded in the answer.</i></p>	1	●	0	0	1	1	1	0		0	0	1	0	0	Mantissa								Exponent					3
1	●	0	0	1	1	1	0		0	0	1	0	0																	
Mantissa								Exponent																						

6	(e)	<table border="1"> <thead> <tr> <th>Calculation</th> <th>Type of Error</th> </tr> </thead> <tbody> <tr> <td>Multiplying two very large numbers together.</td> <td>Overflow;</td> </tr> <tr> <td>Dividing a number by a very large number.</td> <td>Underflow;</td> </tr> <tr> <td>Adding together two numbers of very different sizes e.g. a tiny number to a very big number.</td> <td>Cancellation;</td> </tr> </tbody> </table>		Calculation	Type of Error	Multiplying two very large numbers together.	Overflow;	Dividing a number by a very large number.	Underflow;	Adding together two numbers of very different sizes e.g. a tiny number to a very big number.	Cancellation;	3
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Adding together two numbers of very different sizes e.g. a tiny number to a very big number.	Cancellation;											
If same answer is used more than once and it is correct in one instance then award the mark for the correct instance.												

### June 2016 AS Paper 2

02	3	<p><b>Marks are for AO2 (apply)</b></p> <p>3 9/16 // 3.5625</p> <p><b>Mark as follows:</b>  <b>1 mark</b> for correct integer part (3)  <b>1 mark</b> for correct fractional part (9/16 or .5625)</p> <p><b>Alternative answer</b> 57/16;;</p>	2
02	4	<p><b>Mark is for AO2 (apply)</b></p> <p>57;</p>	1

### June 2017 AS Paper 2

02	1	<p><b>1 mark for AO1 (understanding) and 1 mark for AO2 (apply)</b></p> <p><b>Mark as follows:</b></p> <p><b>AO1 (understanding) – 1 mark:</b>  The bit pattern is split into 4-bit sections (<b>A</b>. A byte is split in half). Each section is then converted to decimal, with any values above 9 being represented as a letter from A to F / each group of bits is converted to a hexadecimal character;</p> <p><b>NE.</b> 4-bits are converted to hexadecimal.</p> <p><b>AO2 (apply) – 1 mark:</b>  In the example, the sections are 0001 and 0111. 0001 is 1 in denary, and 0111 is 7 in denary, meaning we are left with the final answer of <u>17</u>;</p>	2
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02	2	<p><b>Mark is for AO2 (apply)</b></p> <p>00011101;</p> <p>I. leading zeroes not given</p>	<b>1</b>
02	3	<p><b>Marks are for AO2 (apply)</b></p> <p>Figure 1a shifted left by 1: 000101110  Figure 1a shifted left by 2: 0001011100;</p> <p>Answer: 10001010;</p> <p><b>Mark as follows:</b>  <b>1 mark</b> for <b>both</b> correct shifts  <b>1 mark</b> for correct answer  //  <b>2 marks</b> if correct answer and any relevant working shown.</p> <p>I. leading zeros not given.  A. Alternative method of working.</p>	<b>2</b>
02	4	<p><b>Mark is for AO2 (analyse)</b></p> <p>10011.011;</p> <p><b>1 mark</b> for fixed point clearly between 5<sup>th</sup> and 6<sup>th</sup> digits.</p>	<b>1</b>



11	4	<p><b>All marks AO2 (apply)</b></p> <p><b>2 marks</b> for working:</p> <p>Correct representation of 58.5 in fixed point binary: 111010.1; <b>A.</b> leading 0s. Showing the correct value of the exponent in denary (6) or binary (110) // showing the binary point being shifted 6 places;</p> <p><b>MAX 2</b></p> <p><b>1 mark</b> for correct mantissa and exponent together:</p> <table border="1" style="margin-left: 20px;"> <tr> <td>0</td><td>●</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td> </tr> </table> <p style="text-align: center; margin-left: 20px;">Mantissa</p> <table border="1" style="margin-left: 20px;"> <tr> <td>0</td><td>1</td><td>1</td><td>0</td> </tr> </table> <p style="text-align: center; margin-left: 20px;">Exponent</p>	0	●	1	1	1	0	1	0	1	0	1	1	0	3
0	●	1	1	1	0	1	0	1								
0	1	1	0													

		<p><b>If answer is correct and some working has been shown, award three marks, even if working would not have gained credit on its own.</b></p> <p><b>Working marks can be awarded for work seen in the final answer eg correct exponent.</b></p>	
11	5	<p><b>Mark is for AO2 (apply)</b></p> <p>0.05 // 13.8 – 13.75;</p> <p><b>A.</b> Award BOD mark if correct method has been shown i.e. 13.8 – 13.75 but candidate has then made an error performing the subtraction operation <b>R.</b> -0.05 unless the accept point above also applies</p>	1
11	6	<p><b>Mark is for AO2 (apply)</b></p> <p>0.36(%)</p> <p><b>A.</b> 0.0036 // 0.05 ÷ 13.8 <b>A.</b> Follow-through of incorrect answer to question part 11.5 <b>A.</b> Award BOD mark if correct method has been shown but candidate has then made an error performing the division operation</p>	1

### June 2011 Comp 1

02	256 // 2 <sup>8</sup> ;	1
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## June 2012 Comp 1

<b>01</b>	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%;"></th> <th style="width: 20%;">Answer</th> <th style="width: 20%;">Carry</th> <th style="width: 30%;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td></td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">;</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">;</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">;</td> </tr> </tbody> </table> <p><b>A.</b> 10 instead of 0 in the Answer column for the final row of the table</p>			Answer	Carry		0	0	0	0		0	1	1	0	;	1	0	1	0	;	1	1	0	1	;	<b>3</b>
		Answer	Carry																								
0	0	0	0																								
0	1	1	0	;																							
1	0	1	0	;																							
1	1	0	1	;																							

## June 2013 Comp 1

<b>02</b>	<p>0111.1010 // 01111010</p> <p><b>Mark as follows:</b> 4 bits before binary point are 0111; 4 bits after binary point are 1010;</p>	<b>2</b>
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<b>03</b>	<p>1;110 1110;</p> <p><b>R.</b> if not 8 bits</p>	<b>2</b>
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<b>04</b>	<p>127;</p>	<b>1</b>
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<b>05</b>	<p>The number to subtract is converted into a negative number; <b>NE.</b> Convert into two's complement This is then added to the first number;</p> <p>Two marks for example:</p> $  \begin{array}{r}  23 = 00010111 \\  -48 = 11010000; \\  \hline  11100111; (= -25)  \end{array}  $ <p><b>A.</b> if not used 8 bits in examples <b>A.</b> 23 + -48 is worth 1 mark only (if there is no description)</p> <p><b>Note:</b> for the first mark in the example to be awarded the two bit patterns must be correct. For the second mark in the example accept an incorrect answer as long as it is a correct addition using one of the two correct bit patterns.</p>	<b>4</b>
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## June 2013 Comp 3

<b>2</b>	<b>(a)</b>	<p>One mark per correct answer:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="text-align: left; padding: 5px;">Value description</th> <th style="text-align: left; padding: 5px;">Correct letter (A-D)</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">A negative value.</td> <td style="padding: 5px;">D;</td> </tr> <tr> <td style="padding: 5px;">The smallest positive value that can be represented.</td> <td style="padding: 5px;">A;</td> </tr> <tr> <td style="padding: 5px;">A value that is not valid in the representation because it is not normalised.</td> <td style="padding: 5px;">C;</td> </tr> </tbody> </table> <p style="margin-top: 10px;">If a letter is used more than once then mark as correct in the position that is correct.</p>	Value description	Correct letter (A-D)	A negative value.	D;	The smallest positive value that can be represented.	A;	A value that is not valid in the representation because it is not normalised.	C;	<b>3</b>
Value description	Correct letter (A-D)										
A negative value.	D;										
The smallest positive value that can be represented.	A;										
A value that is not valid in the representation because it is not normalised.	C;										

<b>2</b>	<b>(b)</b>	<p><b>1 method mark</b> for either:</p> <ul style="list-style-type: none"> <li>• showing correct value of both mantissa and exponent in denary</li> <li>• showing binary point shifted 6 places to right in mantissa</li> <li>• indicating that final answer calculated using  <math display="block">\text{answer} = \text{mantissa} \times 2^{\text{exponent}}</math> </li> </ul> <p style="margin-top: 10px;">Mantissa = 0.625 // 5/8          Exponent = 6</p> <p><b>1 mark</b> for correct answer</p> <p>Answer = 40</p> <p style="margin-top: 10px;"><i>If answer is correct and some working has been shown, award two marks, even if working would not have gained credit on its own.</i></p>	<b>2</b>
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2	(c)	<p><b>2 marks</b> for working:</p> <p>Correct representation of 7.75 in fixed point binary: 111.11; <b>A.</b> leading and trailing 0s.  Bits flipped: 000.00 // 1000.00; <b>A.</b> leading 1s  Correct representation of -7.75 in fixed point twos complement: 1000.01; <b>A.</b> leading 1s  Showing the correct value of the exponent in denary (3) or binary (11) // showing the binary point being shifted 3 places;</p> <p><i>Note: Award both working marks if bit pattern 1.00001 is shown anywhere</i></p> <p><b>MAX 2</b></p> <p><b>1 mark</b> for correct mantissa and exponent together:</p> <table border="1" data-bbox="516 953 1079 1024"> <tr> <td>1</td><td>•</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td> </tr> </table> <p>Mantissa</p> <table border="1" data-bbox="516 1094 800 1165"> <tr> <td>0</td><td>0</td><td>1</td><td>1</td> </tr> </table> <p>Exponent</p> <p><i>If answer is correct and some working has been shown, award three marks, even if working would not have gained credit on its own.</i></p> <p><i>Working marks can be awarded for work seen in the final answer e.g. correct exponent.</i></p>	1	•	0	0	0	0	1	0	0	0	0	1	1	3
1	•	0	0	0	0	1	0	0								
0	0	1	1													

2	(d)	(i)	<p>0.025 // 6.9-6.875 // 1/40</p> <p><b>R.</b> -0.025</p> <p><b>A.</b> award <b>BOD</b> mark if correct method has been shown i.e. 6.9-6.875 but candidate has then made an error performing the subtraction operation</p>	1
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2	(d)	(ii)	<p>0.003623 // 0.025/6.9 // 1/276</p> <p><b>A.</b> 0.3623%</p> <p><b>A.</b> answers rounded to at least two significant figures</p> <p><b>A.</b> follow-through of incorrect answer to part 2di</p> <p><b>A.</b> award <b>BOD</b> mark if correct method has been shown but candidate has then made an error performing the division operation</p> <p><b>R.</b> if shown that incorrect method used e.g. dividing by 6.875, even though this arrives at an answer that is the same when written to 2 significant figures</p>	1
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2	(d)	(iii)	<p><b>Alternative 1:</b> Adjust the <u>mantissa</u>; To use more bits; <b>A.</b> "longer" for "more bits" but <b>R.</b> "larger", "increase size"</p> <p><b>Alternative 2:</b> Reallocate (one) bit; from the exponent to the mantissa; <b>A.</b> bits</p> <p><b>Alternative 3:</b> Infer one of the two bits on either side of the binary point (from the other, as they must both be different); use the freed up bit to store one more significant digit in the mantissa// use the freed up bit to represent mantissa more accurately;</p>	2
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## Specimen AS Paper 2

<b>02</b>	<b>2</b>		<p><b>All marks AO2 (apply)</b></p> <p>1001; 0110;  <b>1 mark:</b> correct first four bits  <b>1 mark:</b> correct bits in position 5-8</p>	2
<b>02</b>	<b>3</b>		<p><b>All marks AO2 (apply)</b></p> <p>1;0111101;  <b>2 marks:</b> Correct answer only</p>	2
<b>02</b>	<b>4</b>		<p><b>Mark is for AO2 (apply)</b></p> <p>10101011;</p>	1
<b>02</b>	<b>5</b>		<p><b>Mark is for AO1 (understanding)</b></p> <p>The result is too large to be represented;          (it causes) overflow;          The result represents a negative value;  <b>Max 1 mark</b></p>	1

## Specimen Paper 2

<b>08</b>	<b>1</b>	<p><b>All marks AO1 (understanding)</b></p> <p><b>1 mark per correct response:</b></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Value description</th> <th style="padding: 5px;">Correct letter (A-D)</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">A positive normalised value.</td> <td style="padding: 5px; text-align: center;">A</td> </tr> <tr> <td style="padding: 5px;">The most negative value that can be represented.</td> <td style="padding: 5px; text-align: center;">C</td> </tr> <tr> <td style="padding: 5px;">A value that is not valid in the representation because it is not normalised.</td> <td style="padding: 5px; text-align: center;">B</td> </tr> </tbody> </table> <p style="margin-top: 10px;">If a letter is used more than once then mark as correct in the position where it is correct (if any).</p>	Value description	Correct letter (A-D)	A positive normalised value.	A	The most negative value that can be represented.	C	A value that is not valid in the representation because it is not normalised.	B	3
Value description	Correct letter (A-D)										
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The most negative value that can be represented.	C										
A value that is not valid in the representation because it is not normalised.	B										

08	2	<p><b>All marks AO2 (apply)</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">● 1</td> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">1</td> <td style="width: 20px; height: 20px;">1</td> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">0</td> </tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">1</td> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">1</td> </tr> </table> </div> <p style="text-align: center; margin-top: 5px;">Mantissa <span style="margin-left: 150px;">Exponent</span></p> <p><b>1 method mark</b> for either:</p> <ul style="list-style-type: none"> <li>• showing correct value of both mantissa and exponent in denary (Mantissa = 0.6875 // 11/16, Exponent = 5)</li> <li>• showing binary point shifted 5 places to right in binary number</li> <li>• indicating that final answer calculated using <math>\text{answer} = \text{mantissa} \times 2^{\text{exponent}}</math></li> </ul> <p><b>1 mark</b> for correct answer</p> <p>Answer = 22</p> <p><b>If answer is correct and some working has been shown, award two marks, even if working would not have gained credit on its own.</b></p>	0	● 1	0	1	1	0	0	0	0	1	0	1	2
0	● 1	0	1	1	0	0	0								
0	1	0	1												

08	3	<p><b>All marks AO2 (apply)</b></p> <p><b>2 marks</b> for working:</p> <p>Correct representation of 6.75 in fixed point binary: 110.11; <b>A.</b> leading 0s. Correct representation of -6.75 in two's complement fixed point binary: 1001.01; <b>A.</b> leading 1s. Showing the correct value of the exponent in denary (3) or binary (11) // showing the binary point being shifted 3 places;</p> <p><b>Max 2</b></p> <p><b>1 mark</b> for correct mantissa and exponent together:</p> <table border="1" data-bbox="409 730 917 793"> <tr> <td>1</td><td>●</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td> </tr> </table> <p style="text-align: center;">Mantissa</p> <table border="1" data-bbox="409 856 665 919"> <tr> <td>0</td><td>0</td><td>1</td><td>1</td> </tr> </table> <p style="text-align: center;">Exponent</p> <p><b>If answer is correct and some working has been shown, award three marks, even if working would not have gained credit on its own.</b></p> <p><b>Working marks can be awarded for work seen in the final answer eg correct exponent.</b></p>	1	●	0	0	1	0	1	0	0	0	0	1	1	3
1	●	0	0	1	0	1	0	0								
0	0	1	1													
08	4	<p><b>All marks AO1 (understanding)</b></p> <p><b>1 mark:</b> Reduced precision; <b>1 mark:</b> Increased range; <b>A.</b> can represent larger/smaller numbers</p>	2													