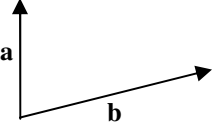
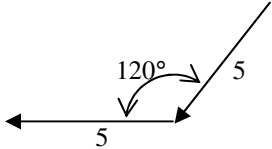


<p>1. Vectors <b>a</b> and <b>b</b> are as shown. Construct vectors <b>b + a</b> and <b>a - b</b>.</p> 	<p>2. Refer to Q1. Describe a vector that is linearly independent of <b>a</b> and <b>b</b>.</p>
<p>3. Find a vector <b>c</b> that is linearly dependent on vectors <b>p</b>, <b>q</b> and <b>r</b>.</p>	<p>4. Vector <b>r</b> has a magnitude of 10 and makes angles of <math>30^\circ</math>, <math>45^\circ</math> and <math>60^\circ</math> respectively with <b>i</b>, <b>j</b> and <b>k</b>. Express <b>r</b> in terms of <b>i</b>, <b>j</b> and <b>k</b>.</p>
<p>5. Find the magnitude of <math>\mathbf{p} = 3\mathbf{i} - 4\mathbf{j} + 5\mathbf{k}</math>, and the exact values of <math>\cos \alpha</math>, <math>\cos \beta</math> and <math>\cos \gamma</math>, where <math>\alpha</math>, <math>\beta</math> and <math>\gamma</math> are the angles that <b>p</b> makes with the <i>x</i>, <i>y</i> and <i>z</i> axes respectively.</p>	<p>6. Find the scalar product of the two vectors shown below.</p> 
<p>7. Find the values of <i>c</i> and <i>d</i> so that <math>2\mathbf{i} + 2\mathbf{j} - c\mathbf{k}</math> is perpendicular to <math>\mathbf{i} + d\mathbf{j} + 6\mathbf{k}</math>.</p>	<p>8. Find the projection of <math>\mathbf{i} + \mathbf{k}</math> onto <math>-\mathbf{i} + \mathbf{j} - 2\mathbf{k}</math>, i.e. the scalar resolute of <math>\mathbf{i} + \mathbf{k}</math> in the direction of <math>-\mathbf{i} + \mathbf{j} - 2\mathbf{k}</math>.</p>
<p>9. Resolve <math>10\mathbf{i} + 7\mathbf{j} - 11\mathbf{k}</math> into two components, one is parallel to <math>5\mathbf{k}</math> and the other perpendicular to it.</p>	<p>10. Resolve <math>10\mathbf{i} + 7\mathbf{j} - 11\mathbf{k}</math> into two components, one is parallel to <math>4\mathbf{i} + 2\mathbf{j} - 3\mathbf{k}</math> and the other perpendicular to it.</p>
<p>11. <b>a</b>, <b>b</b> and <b>c</b> are orthogonal vectors. Express the cosine of the angle between <math>\mathbf{a} + \mathbf{b} + \mathbf{c}</math> and <b>c</b> in terms of <b>a</b>, <b>b</b> and <b>c</b>.</p>	<p>Numerical, algebraic and worded answers.</p> <p>2. E.g. a vector that points out of (or into) the page.          3. E.g. <math>\mathbf{c} = 2\mathbf{p} - \mathbf{q} + 0.2\mathbf{s}</math>          4. <math>5\sqrt{3}\mathbf{i} + 5\sqrt{2}\mathbf{j} + 5\mathbf{k}</math>          5. <math>5\sqrt{2}, 3\sqrt{2}/10, -4\sqrt{2}/10, \sqrt{2}/2</math>          6. 12.5          7. <math>c \in \mathbb{R}, d = 3c - 1</math>          8. <math>-\sqrt{6}/2</math>          9. <math>-11\mathbf{k}, 10\mathbf{i} + 7\mathbf{j}</math>          10. <math>12\mathbf{i} + 6\mathbf{j} - 9\mathbf{k}, -2\mathbf{i} + \mathbf{j} - 2\mathbf{k}</math>          11. <math> \mathbf{c}  / \sqrt{( \mathbf{a} ^2 +  \mathbf{b} ^2 +  \mathbf{c} ^2)}</math></p>