

SPORT SPECIFIC QUESTIONS

BASKETBALL QUESTIONS

Quintic[®]

1 for Sports Analysis

Basketball Questions

Basketball is an exciting and fast paced game. It requires shooting, passing, catching, bouncing skills often while jumping and running. Watch the following video clips and answer the following questions to gain a better understanding of this sport.

- Quintic Video Files you will use for these questions:**
- 1) **Boxing out 3**
 - 2) **Lay-up 3**
 - 3) **Pass-Shoot2-SV**
 - 4) **Free-throw-sv1**
 - 5) **Rebound 1**
 - 6) **Lay-up 3(left)**
 - 7) **Over head pass1-sv**
 - 8) **Javelin pass 1-sv'**
 - 9) **Lay-up 2(left)**
 - 10) **Defence 2-fv**
 - 11) **Free throw sv3**

PLAY AND PAUSE

Open the video file 'Boxing out 3'

1) Watch the video at full speed by pressing this button: 

(i) Watch the clip a number of times at full speed and then at slow* 8. If you were a basketball coach, at which speed would you view the video clip if you were meeting with the player to discuss their technique. Explain your answer.

.....

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.....

- (ii) Now watch the video through frame-by-frame. Write a description of the boxing out technique as if you were teaching this defensive skill to a novice player.

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Open the video file ‘Lay-up 3’

- 2) Scroll the video to the frame at which the player leaves the ground.

- (i) Which frame is this?

.....

- (ii) In this frame, which points are identified by these coordinates:

a. X = 288.00 Y = 470.00

.....

b. X = 303.00 Y = 392.00

.....

c. X = 278.00 Y = 50.00

.....

d. X = 323.00 Y = 317.00

.....

TIMING

Open the video file ‘Pass-Shoot2-SV’

- 3) Set your markers at frames **18, 24, 45, 59, 66, 75.**

These frames mark significant points during the action and you can use the stopwatch function to find the time differences between these points.

- (i) Use the options from the box to complete the table below matching up the frame numbers, description of key frames and time differences.

<u>Frame Number</u>	<u>Description</u>	<u>Time Differences</u>
• 18	• Player is totally off the floor	• 0.18 sec
• 24		• 0.14 sec
• 45	• Right toe reaches black line	• 0.28 sec
• 59		• 0.42 sec
• 66	• Player catches the ball	• 0.12 sec
• 75		
	• Player lands back on the floor	
	• Player has released the ball	
	• Left leg has crossed the red line	


Frame	Description	Time difference
18		
24		
45		
59		
66		
75		

Open the video file ‘Free-throw-sv1’


- 4) Use your markers and the stopwatch function to find the time difference between:
- (i) ‘The ball making contact with the floor’ and ‘the ball returning to the player’s hand.’
.....
 - (ii) Frame 95 and ‘right heel leaves the floor’
.....
 - (iii) Frame 143 and ‘release of the ball’.
.....
 - (iv) Frame 0 and ‘release of the ball’
.....
 - (v) Why is it important for the player to release the ball at the right time? Explain your answer.
.....
.....
.....
.....

ANGLES AND SHAPES

Open the video file ‘Rebound 1’

- 5) Every 10 frames from frame 0, draw a red circle around the ball. This will create a trace of the movement of the ball.
- (i) Create a ‘Single Image Capture’ of this image using this button:

 - (ii) Save this as a JPEG.
 - (iii) Open this JPEG in Microsoft Word and give it an appropriate title, including your name.
 - (iv) Ask your teacher if you may print it.

Open the video file ‘Lay-up 3 (left)’

- 6) Set the Zoom to 1.2.
- (i) Every 10 frames between frame 0 and 130 draw the following angles and write down its value.


- Frame 0 - angle of the right elbow (shoulder-elbow-wrist)
.....
- Frame 10 - angle of the right knee (ankle-knee-hip)
.....
- Frame 20 - angle of the left knee:
.....
- Frame 30 - angle of the left ankle (knee- ankle-toe):
.....
- Frame 40 - angle of the left elbow:
.....
- Frame 50 - angle of the right knee:
.....
- Frame 60 - angle of the left elbow:
.....
- Frame 70 - angle of the right hip (shoulder-hip-knee)
.....
- Frame 80 - angle of the right knee:
.....
- Frame 90 - angle of the left elbow:
.....
- Frame 100- angle of the left knee:
.....
- Frame 110 - angle of the left hip:
.....
- Frame 120 - angle of the left shoulder:
.....
- Frame 130 - angle of the left ankle:
.....

SYNCHRONISATION– (Quintic Sports, Quintic Coaching and Quintic Biomechanics only)

**Open the video file ‘Over head pass1-sv’ in the Main window
Open the video file ‘Javelin pass1-sv’ in the Best window**

7) Scroll to the frame in both videos in which the player releases the ball.

- (i) Synchronise the two videos at these points.
- (ii) Play the videos through and describe five differences between the two passing techniques.

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-
-
-
-
-
-

BLEND – (Quintic Sports, Quintic Coaching and Quintic Biomechanics only)

Open the video file ‘lay-up 2(left)’

8) Set the video zoom to 1.2 and watch the video several times to familiarise yourself with the passing technique.

- (i) Play and pause the video at frame 50.
- (ii) Which key point in the action does this represent?

(iii) ‘Set Background’ at frame 27 so it can be used in the Blend function.

(iv) How has the basketball player changed her body shape compared to the background in:
 Frame 38?

Frame 48?

Frame 55?

Frame 66?

.....

Frame 82?

.....

MULTIPLE – SCREEN IMAGE CAPTURE - (Quintic Sports, Quintic Coaching and Quintic Biomechanics only)

Open the video file ‘defence 2-fv’

9)

- (i) Create a 9 frame ‘Multiple Screen Capture’ of the following frames showing the desired angles and a text box showing the angle value.
 - Frame 85 – Angle of the right elbow (shoulder - elbow - wrist)
 - Frame 90 – Angle of right wrist to the horizontal (elbow - wrist)
 - Frame 100 – Angle of right knee
 - Frame 150 – Angle of the left knee (ankle - knee - hip)
 - Frame 170 – Angle of the right ankle (knee - ankle- toe)
 - Frame 180 – angle of the left knee (hip - knee - ankle)
 - Frame 200 – Angle of the left hip to the vertical (shoulder - hip)
 - Frame 52 – Angle of the left knee (hip - knee - ankle)




- (ii) Save this as a JPEG.
- (iii) Open this JPEG in Microsoft Word and give it an appropriate title, including your name.
- (iv) Ask your teacher if you may print this document.

DIGITISATION – (Quintic Biomechanics only)

Open the video file ‘free throw-SV 3’

10) A digitisation template has already been completed for this video, which tracks the left hand side of the bowler.

- (i) Load the frame template.
- (ii) Complete a digitisation trace between frames 75 and 160.
- (iii) Save this trace.
- (iv) The video file has already been calibrated for you.
- (v) Using the ruler function  , find out the lengths of the following:

(Hint: Scroll through the video frames until you see the best angle at which to take your measurement i.e. for the upper-arm measurement, when the shoulder and elbow are clearly visible.)

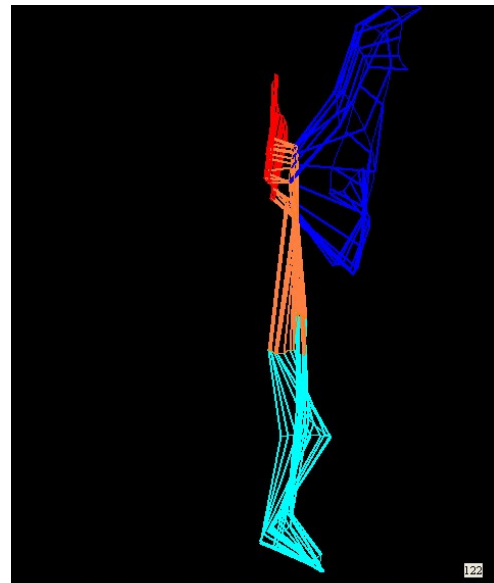
Object	Length (m)
Forearm	
Trunk	
Thigh	
Foot	
Head	

11)

- (i) Open the animation window.
- (ii) Which buttons are used in combination to create the following pictures? (Hint: All look at the frame number in the bottom right hand corner of each picture)



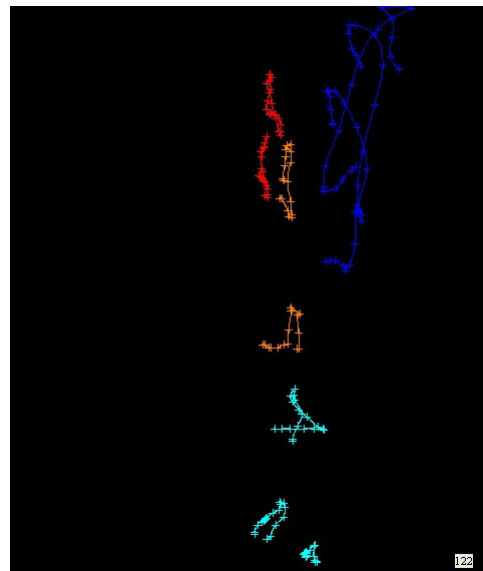
a)




b)



c)



d)

12) Open the Analysis window 

Select 'Display Graphs', then 'Linear distance, velocity and acceleration'.

Fill in the tables with the correct number of stars to produce the following graphs. Choose 1 star, 2 stars or 0 stars for each box:

- a) Horizontal velocity of all points **without** exact values displayed.
 Acceleration of the right knee **with** exact values displayed.
 Velocity of the right ankle **with** exact values displayed.

	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of Head	<input type="text"/>								
7th Cervical									
Right Glenohumeral									
Right Hip									
Right Elbow									
Right Wrist									
Right Finger									
Right Knee									
Right Ankle									
Right Toe									

- b) Horizontal distance of all points **without** exact values displayed.
 Vertical velocity of all points **with** exact values displayed.
 Distance of the 7th cervical **with** exact values displayed.

	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of Head	<input type="text"/>								
7th Cervical									
Right Glenohumeral									
Right Hip									
Right Elbow									
Right Wrist									
Right Finger									
Right Knee									
Right Ankle									
Right Toe									

- c) Acceleration of the left hip and right hip **with** exact values displayed.
 Horizontal velocity of all points **with** exact values displayed.
 Horizontal distance of the left 3rd finger ankle **with** exact values displayed.

	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of Head	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7th Cervical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Glenohumeral	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Hip	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Elbow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Wrist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Finger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Knee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Ankle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Toe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- d) Vertical acceleration of the left wrist **without** exact values displayed.
 Horizontal velocity of the left toe **without** exact values displayed.
 Vertical distance of the vertex of the head **with** exact values displayed.

	Distance	Velocity	Accn	Horizontal Distance	Vertical Distance	Horizontal Velocity	Vertical Velocity	Horizontal Accn	Vertical Accn
Vertex of Head	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7th Cervical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Glenohumeral	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Hip	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Elbow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Wrist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Finger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Knee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Ankle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Toe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13) Look at the digitisation data and save it as an Excel file. Open this file in Excel and answer the following questions.

In frame 25, what are the values of:

- (i) Horizontal distance of the knee?
.....
- (ii) Vertical distance of the ankle?
.....
- (iii) Distance of the hip?
.....
- (iv) Vertical distance of the shoulder?
.....
- (v) Horizontal distance of the toe?
.....
- (vi) Distance of the toe?
.....

14) Use the 'Graph Display Options' to find the following values 1.3 seconds after the start of digitisation.

- (i) Vertical velocity of the toe?
.....
- (ii) Vertical acceleration of the ankle?
.....
- (iii) Horizontal distance of the shoulder?
.....
- (iv) Velocity of the knee?
.....
- (v) Acceleration of the knee?
.....
- (vi) Horizontal velocity of the hip?
.....

15) At the frame of ball impact, what are the values of:

- (i) Velocity of the hip?
.....
- (ii) Vertical velocity of the knee?
.....
- (iii) Horizontal distance of the ankle?
.....
- (iv) Acceleration of the toe?
.....
- (v) Horizontal acceleration of the shoulder?
.....
- (vi) Vertical distance of the hip?
.....

- 16) Look at the graphs and data that have been produced by the digitisation that you have just completed. Use your experience and sports science background to suggest interventions and training methods to improve the athletic performance of the basketball player.



Quintic would like to thank The Nottingham Wildcats and all the individuals' involved for supplying the video footage.

All video footage was captured and edited using Quintic Biomechanics 9.03v9 by Quintic Consultancy Ltd.